THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXV. No. 617.] LONDON, MARCH 9, 1875. [27TH YEAR.] Price 6d.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—10,000 cubic feet of gas per ton of coal; 26-candle gas; 13¼ cwt. coke per ton of coal.
The London Exhibition in 1851 was lighted with gas made from Ramsay's Cannel.
RAMSAY'S PATENT CONDENSED COKE.
DO. GARESFIELD COKE.

RAMSAY'S FIRE-CLAY ARTICLES.
GAS-RETORTS, introduced 1828. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES. CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.
Manufactories—Derwenthaugh, Swalwell, and Hebburn Quay, near Newcastle-on-Tyne; and London Wharves—Falcon Wharf, No. 80, Bankside; and Honduras Wharf, Cubitt Town. Large stocks kept.
Address G. H. RAMSAY, NEWCASTLE-ON-TYNE.

GENUINE TORBAY PAINT
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SPECIAL GASOMETER PAINT
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FOUR PRIZE MEDALS.
WORKS: BRIXHAM, TORBAY.
These Paints are now used in 100 Country Gas-Works, and by all (but one) of the London Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. They will cover tar effectually. Also used by the Admiralty, War Office, Railway Companies, Founders, &c.
They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations.
The covering powers are considerably greater than those of any other Paint.—*See "Engineer," Nov.* 2, 1866.
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FOR
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WELL-SEASONED PLANKS.
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COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, BLAYDON-ON-TYNE,
Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and OTHER OBJECTS in FIRE-CLAY," and they were also awarded at the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
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Coal Office,
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THE OLD TUBE-WORKS, WEDNESBURY;
AND
THE ALMA WORKS, WALSALL.
Established at the commencement of Gas Lighting.
WAREHOUSES:
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35, 36, 37, & 39, GRANBY ROW, MANCHESTER.
J. R. and Co. are the original manufacturers of Wrought-Iron Gas Tubes and Fittings, and Inventors of the LAP-WELDED TUBES for Locomotive and Marine Boilers.
J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water; Gun-Metal Cocks, Stocks, and Dies; Galvanized Tubes and High-Pressure Tubes, &c.
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BELL BARN ROAD, BIRMINGHAM,
MANUFACTURERS OF
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OF
FIRST-CLASS MATERIALS & WORKMANSHIP;
Also, STATION-METERS, PRESSURE-GAUGES, STREET-LAMPS, REGULATORS, &c.
ESTABLISHED 1830.

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CAST & WROUGHT IRON TANKS FOR DITTO,
And Gas Apparatus of every Description.
Mains, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.
SUGAR, SALTPETRE, AND ALL KINDS OF PANS.
Roofs, Girders, and Bridges, and General Smith's Work.
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CONTRACTORS
FOR THE
ERECTION OF NEW & REMODELLING OF EXISTING GAS-WORKS.
RETORT-SETTING A SPÉCIALITÉ.
RETORTS SET, AND GUARANTEED TO BURN OFF A CERTAIN AMOUNT OF COAL, OR ELSE NO MONEY TAKEN FOR THE CONTRACT.
PLANS ON APPLICATION.
Retort-Setters sent to all parts of Europe and America.
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For the English Government, and for the Government of the Netherlands;
MAKERS OF THE DUPLICATE COPY
Presented by Her Majesty's Government to the French Government;
AND MANUFACTURERS OF
IMPROVED
DRY GAS-METERS,
Warranted to Measure correctly, and not to vary.
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236, GEORGE STREET, GLASGOW: AND 15, MARKET STREET, MANCHESTER.

G. G. and Co. have just received the only Medal awarded for Gas-Meters at the Vienna International Exhibition.

SILVER MEDAL, PARIS EXHIBITION, 1867.

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WROUGHT-IRON TUBES AND FITTINGS

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LAP-WELDED IRON AND HOMOGENEOUS METAL BOILER TUBES.

Boiler-Tube Ferrules, Gun-Metal Gland Cocks, Water-Gauges, Whistles, &c.; Stocks, Taps, and Dies for Screwing, and Gas-Fitters Tools.

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MANUFACTURERS of FIRE-BRICKS, LUMPS, & TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

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LANCASHIRE GAS-METER COMPANY,

LIMITED,

FALCON STREET, OLDHAM.

HENRY THOMAS, Managing Director.

GAS PURIFICATION & CHEMICAL Co., LIMITED,

(Successors to JOHN WILLIAM O'NEILL & CO.,)

Offices—PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.,

CONTRACTORS FOR GAS PURIFICATION

BY

OXIDE OF IRON.

The superiority of the material supplied by this Company is generally recognized, and it is now in use in nearly all the London and most of the large Provincial Gas-Works.

JOHN WILLIAM O'NEILL, SAMUEL H. JOHNSON, } Joint Managing Directors.

TRADE MARK.

THE MEDAL FOR 1862.

The only Prize Medal awarded for TUBES & FITTINGS.

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WAREHOUSE: SOUTHWARK STREET, LONDON.

JAMES RUSSELL & SONS, LIMITED,

PATENTEES & FIRST MAKERS OF WROUGHT-IRON TUBES,

ONLY MAKERS OF HOMOGENEOUS METAL TUBES.

MANUFACTURERS OF

TUBES and FITTINGS for GAS, STEAM, and WATER;

LAP-WELDED, LOCOMOTIVE, MARINE, and other BOILER TUBES;

HYDRAULIC TUBES, BEDSTEAD TUBES, WELL TUBES, TELEGRAPH POSTS, COILS, &c.;

GAS-FITTERS TOOLS, VALVES, COCKS, &c.

THOMAS PIGGOTT & CO.,

(Established 1822,)

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MANUFACTURERS OF

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CAST & WROUGHT IRON TANKS FOR DITTO;

PURIFIERS, CONDENSERS, SCRUBBERS, RETORTS, VALVES;

IMPROVED WROUGHT-IRON RETORT-LIDS, CROSS-BARS, & SCREWS;

AND GAS APPARATUS OF EVERY DESCRIPTION.

SOLE MANUFACTURERS OF LIVESEY'S PATENT GASHOLDER MAN-LID,

By use of which Man-lid, inlet and outlet pipes can be examined and cleansed without loss of gas in crown of holder, or ingress of atmospheric air.

ROOFS, GIRDERS, BRIDGES, AND BOILERS OF ALL KINDS.

Drawings, Specifications, and Estimates supplied on application.

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EVERY DESCRIPTION OF TUBING, GAS, STEAM, HYDRAULIC TUBES AND FITTINGS,
EITHER BLACK, GALVANIZED, OR ENAMELLED HOT WATER TUBES AND FITTINGS,
CORE BARS, COILS, COCKS (IRON OR BRASS),
CHANDELIERS, &c., GAS-FITTERS' TOOLS, GAS TONGS, STOCKS, TAPS, DIES, &c., &c.,
HANDRAIL TUBINGS, IRON AND BRASS, PLAIN OR TWISTED,
TELEGRAPH TUBES OR POLES, &c., &c.

JOHN WRIGHT AND CO., ESSEX WORKS, BIRMINGHAM,

Beg to call the attention of MANAGERS and DIRECTORS of GAS COMPANIES to the following letter which they have lately received.

COPY OF LETTER RECEIVED FROM MAGNUS OHREN, Esq.

To Messrs. John Wright and Co., Essex Works, Birmingham. *Crystal Palace District Gas Company, Lower Sydenham, S.E.*

Dear Sirs,—In reply to your inquiries, I am glad to state that the use of GAS COOKING AND HEATING STOVES has been a complete success here. We have several hundred in use in our districts. We also find it advantageous to let out Stoves at a small rental. We have now 275 Stoves at rent.

The Stoves you make I can with confidence recommend, having so many in use, and giving satisfaction. I need scarcely point out to you the advantage to Gas Companies to recommend the use of Gas Stoves to their Gas Consumers, even where they do not supply them on sale or rent, as the use of Gas Stoves brings day consumption, and thus the Company make a profit by day as well as by night.—I am, dear sirs, yours faithfully, MAGNUS OHREN.

Size, 25½ in. high; 14 in. wide; 12½ in. back to front.

Price 50s., complete with Fan and Gridiron.

GAS HEATING STOVES

(TERRA COTTA AND IRON).

THE CHEERFUL STOVE.

COOKING STOVES.

BREAKFAST COOKERS.

BATHS HEATED by GAS

GAS STOVES

For Boiling, Broiling, Preserving, Heating Flat Irons, and for all other Domestic Purposes.

Gas Companies and the Trade who have not our Illustrated Catalogue are respectfully requested to apply for same.

A LIBERAL DISCOUNT to the TRADE.

No. 4003.

THE CHEERFUL GAS STOVE, with Copper Reflector,

Has all the appearance of a Bright Fire.

PRICE from 32s.

Established

1795.

JOSEPH CLIFF & SON,

THE ORIGINAL

WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

MANUFACTURERS OF ALL DESCRIPTIONS OF

FIRE GOODS, and Salt-Glazed Drain-Pipes.

LONDON WHARF:

Wharf No. 4, inside Great Northern Goods Station, King's Cross, N.;

LIVERPOOL—1, Back Leeds Street,

Where is always kept a Stock of Retorts, Fire-Bricks, Terra Cotta Ware, and Drain-Pipes.

J. T. B. PORTER AND CO.,

ENGINEERS AND CONTRACTORS,

LINCOLN, AND 1, WESTMINSTER CHAMBERS, LONDON, S.W.,

Beg respectfully to remind Gas Companies and Corporations that they continue to manufacture and supply every description of Apparatus connected with the

MANUFACTURE OF GAS AND ITS DISTRIBUTION.

GASHOLDERS, PURIFIERS, SCRUBBERS, CONDENSERS, RETORTS, &c., &c.

PLANS, SPECIFICATIONS, AND ESTIMATES FOR WORKS OF ANY SIZE.

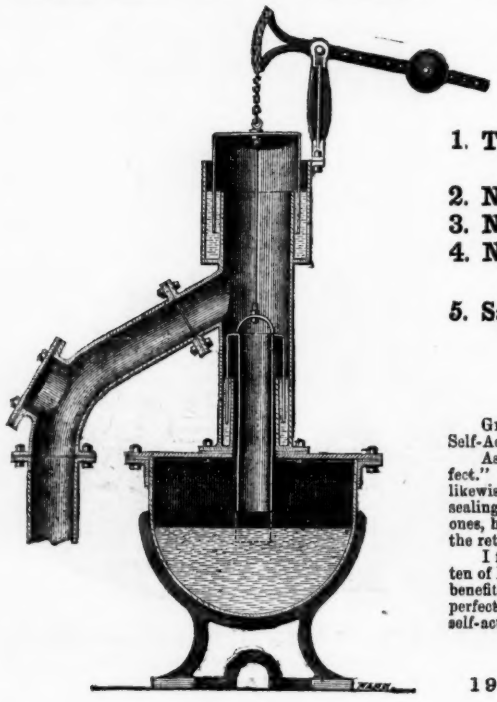
REFERENCES TO MORE THAN 500 WORKS ALREADY ERECTED.

PROSPECTUSES AND TESTIMONIALS ON APPLICATION.

SELF-ACTING REMOVABLE DIP-PIPE,

PATENTED BY

CHANDLER & STEVENSON.



ADVANTAGES.

1. There is no pressure on the Retorts.
2. No deposit of Carbon.
3. No scurfing is required.
4. Never a choked Ascension-Pipe.
5. Saves Fuel and Wear and Tear.
6. Gets 10 per cent. more Gas out of the Coal, and a higher Illuminating Power.
7. Is never out of order.
8. Requires no attention.
9. Is perfectly automatic in its action.

TESTIMONIAL.

Metropolitan District Asylum, Caterham, Surrey, Dec. 14, 1874.

MESSRS. CHANDLER AND STEVENSON.

GENTLEMEN,—I have much pleasure in bearing testimony to the complete working of your "Patent Self-Acting Dip-Pipes," which have now been in constant operation over three months.

As regards the action of the apparatus, I can describe it no better than by calling it "simply perfect." Immediately the retort is charged and the lid secured, the small holder rises, which lifts the Dip; likewise the instant the gas is permitted to escape at the mouthpiece the holder falls, thus perfectly sealing the Dip. I am fully convinced of the superiority of these Self-Acting Dips over Non Self-Acting ones, having experienced the fact that stokers do occasionally neglect to unseal the Dip after charging the retort, thereby causing a waste or loss.

I feel that it is quite unnecessary for me to say more on the subject, excepting that, having had ten of Messrs. Chandler's Dip-Pipes in use more than one year, and having experienced the great benefits derived thereby, inasmuch as the yield of gas from the coal is greatly increased, and the retorts perfectly free from carbon and other advantages, and seeing that the same Dip has been made perfectly self-acting by the second patent, I feel convinced that this is the right thing.—Yours obediently,

W. CRICKMAY, Resident Engineer.

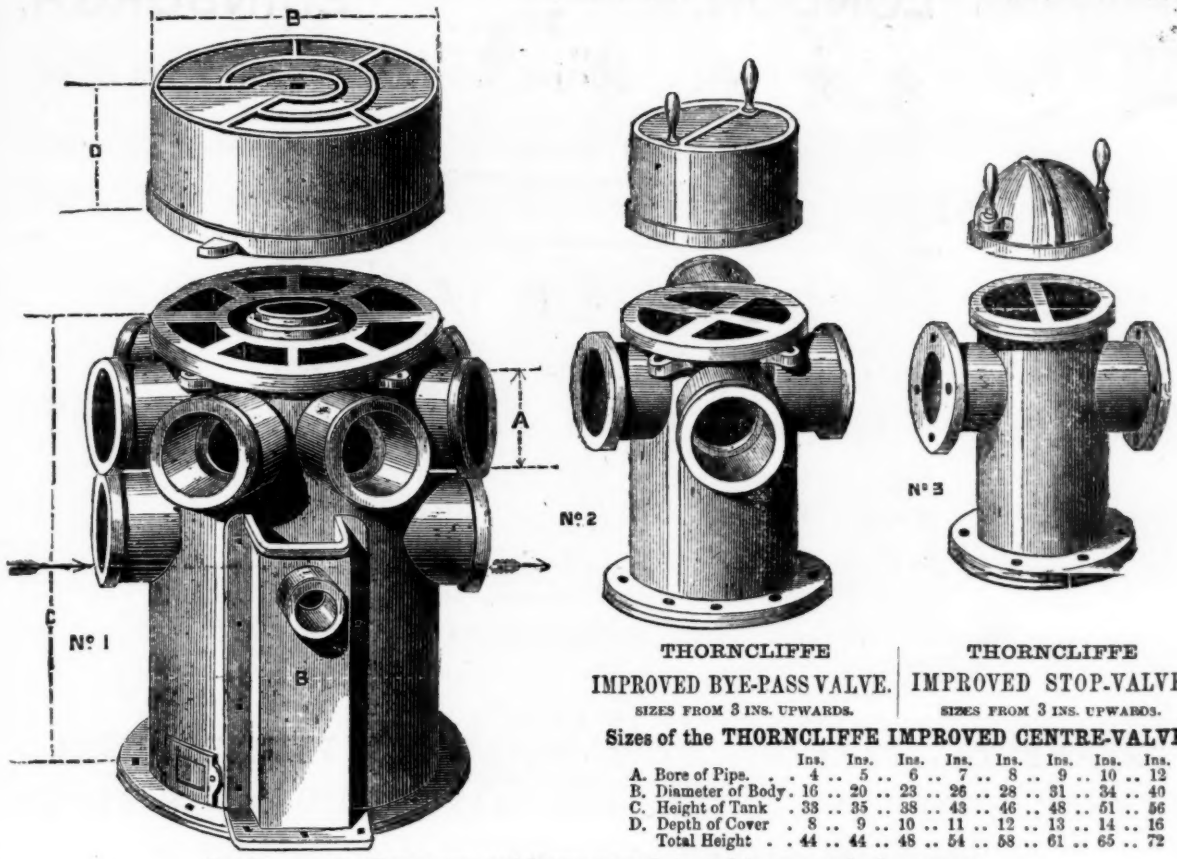
For terms of use and cost, apply to Mr. G. W. STEVENSON,

19, GREAT GEORGE STREET, WESTMINSTER.

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD.

IMPROVED CENTRE-VALVES.



THORNCLIFFE IMPROVED BYE-PASS VALVE. SIZES FROM 3 INS. UPWARDS.

THORNCLIFFE IMPROVED STOP-VALVE. SIZES FROM 3 INS. UPWARDS.

Sizes of the THORNCLIFFE IMPROVED CENTRE-VALVE.

	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
A. Bore of Pipe. . .	4 ..	5 ..	6 ..	7 ..	8 ..	9 ..	10 ..	12
B. Diameter of Body .	16 ..	20 ..	23 ..	26 ..	28 ..	31 ..	34 ..	40
C. Height of Tank .	33 ..	35 ..	38 ..	43 ..	46 ..	48 ..	51 ..	56
D. Depth of Cover .	8 ..	9 ..	10 ..	11 ..	12 ..	13 ..	14 ..	16
Total Height . .	44 ..	44 ..	48 ..	54 ..	58 ..	61 ..	65 ..	72

In all cases the Covers are cast heavy enough to resist any required pressure.

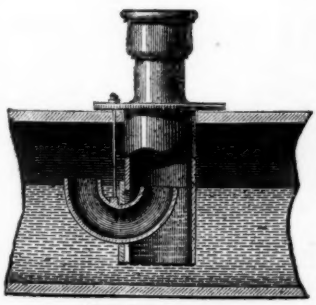
The advantages derived from the adoption of these Valves are so manifest and cardinal that in the immediate character of the change—the simplicity of the machine—the facility affording for cleaning out connexions between Valve and Purifier—the perfect collection and delivery by suitable overflow of the ammonia, at a greatly diminished depth from ground-line over the old form of Valve—the advantage of connecting on the same level, and at any angle, or opposite to each other, the inlet and outlet pipes without dip or rise—the clear acquisition of space in the purifying-house, by being able to place the boxes nearer together, the new Valve being entirely under the floor—and lastly, though of the greatest importance, the passage of crude and unpurified gas during the change is minimized to the merest fraction, thus preventing the fouling by impure gas the delicate machinery and easily affected exposed movements of the station-meter, thereby preventing the introduction of the enemy (unpurified gas) into the gasholder. Also a dead abutment is offered to all back pressure, imparting thereby to the gauges, governors, and hydraulic seals, a steadiness of action never realized with the once famous, but now fast becoming obsolete, Hydraulic Centre-Valve.

N., C., and Co. also Manufacture and Erect

PURIFIERS, CONDENSERS, SCRUBBERS, GASHOLDERS, ROOFS,

And every description of Gas Machinery.

TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.



DIP-PIPE, No. 1.

Messrs. N., C., and Co. are also the Sole Agents for

HAWKINS' PATENT SELF-ACTING HYDRAULIC DIP-PIPES.

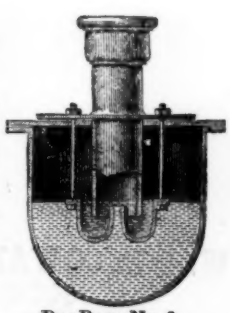
By their use the whole of the pressure caused by the Seal in the Hydraulic Main is entirely avoided, thus securing the many advantages long sought for.

Over 50 Gas Companies have already been supplied with them, many of which have been using them throughout their entire works continuously for over two years.

They can be applied to existing Hydraulic Dips, and at a very small cost.

They seal themselves in the same manner as the ordinary dip-pipes, therefore they are not likely to get out of repair.

By the aid of the adjusting screws they can be made to work on the old principle at pleasure.



DIP-PIPE, No. 2.

FOR PRICES, TESTIMONIALS, &c., APPLY TO

Messrs. NEWTON, CHAMBERS, & CO., Thorncliffe Iron-Works, near Sheffield, Sole Agents;

OR TO THE PATENTEE,

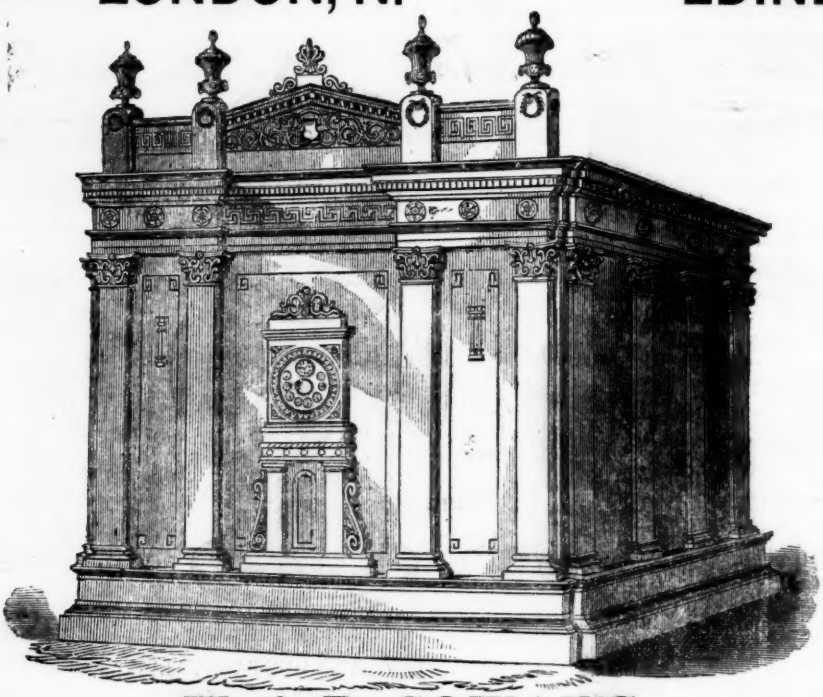
J. G. HAWKINS, NEEPSEND GAS-WORKS, SHEFFIELD.

W. & B. COWAN,

ESTABLISHED 1827,

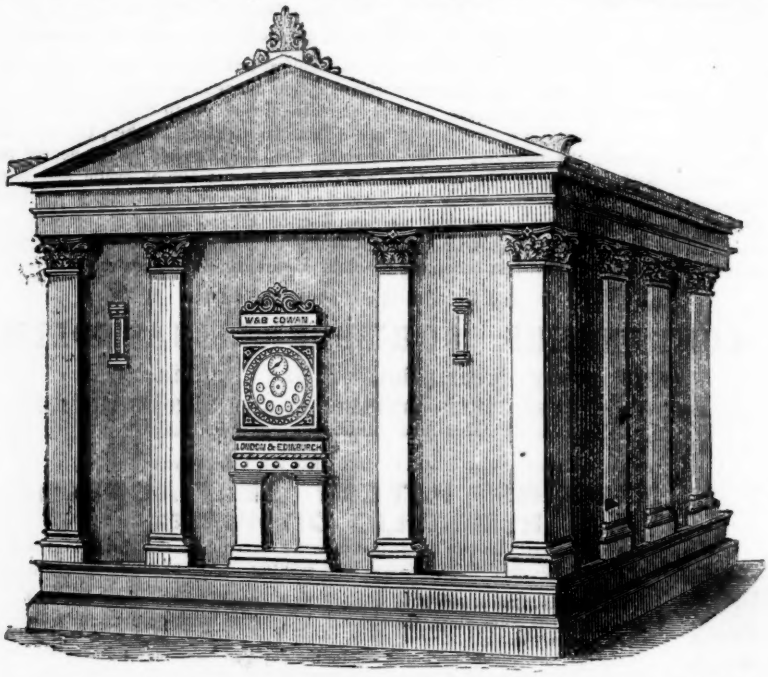
KING HENRY'S WALK,
BALL'S POND ROAD,
(NEAR DALSTON JUNCTION STATION), LONDON, N.

BUCCLEUCH ST. WORKS,
EDINBURGH.



W. & B. COWAN'S
ORNAMENTAL SQUARE STATION-METER with PLANED JOINTS.

SOLE LICENSEES AND MANUFACTURERS OF
WARNER & COWAN'S SELF-REGULATING (DRUM) GAS-METER.



W. & B. COWAN'S PLAIN SQUARE STATION-METER with PLANED JOINTS.
GOVERNORS, PRESSURE REGISTERS, TEST GASHOLDERS, GAUGES, &c.
WET AND DRY METERS SPECIALLY MANUFACTURED FOR STREET-LAMPS.
PRICE LISTS ON APPLICATION.

KING HENRY'S WALK,
BALL'S POND ROAD,
(NEAR DALSTON JUNCTION STATION), LONDON, N.

BUCCLEUCH STREET WORKS,
EDINBURGH.

TANGYE BROTHERS AND HOLMAN,

10, LAURENCE POUNTNEY LANE, LONDON, E.C.

SOLE MAKERS OF

MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH

HOLMAN'S PATENT ECCENTRIC FASTENINGS,

ANTI-FRICTION CATCHES, AND NEW SELF-SUSTAINING CROSS-BARS.

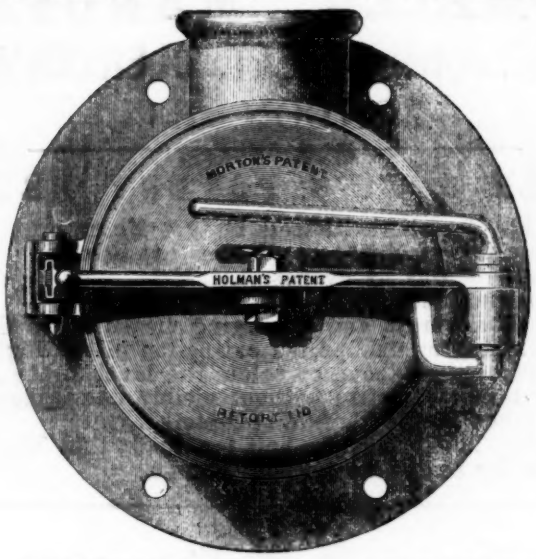
NEARLY 15,000 IN USE.

NO LUTING.

NO DUPLICATE LIDS REQUIRED.

INSTANTANEOUS SEALING EFFECTED.

VERY DURABLE.



HOLMAN'S NEW SELF-SUSTAINING CROSS-BAR ENSURES FREEDOM OF JOINT, AND MAINTAINS PARALLEL POSITION OF THE LIDS.

By the employment of MORTON'S PATENT SELF-SEALING RETORT-LIDS, with HOLMAN'S PATENT ECCENTRIC FASTENINGS, the old-fashioned, cumbersome, and expensive method of sealing Retorts, by luting the lids with lime and other materials, is entirely dispensed with.

Since their introduction in 1869, these Patent Retort-Lids have been thoroughly tested (rigid cast iron is now successfully employed), nearly 15,000 being in use at various Gas-Works in London and the Provinces, among which may be mentioned:—

The Gaslight Co., Beckton (where, by the end of 1875, nearly 4000 will be in use).
" Gaslight Co., Bow Common.
" Gaslight Co., Silvertown.
" Gaslight Co., Lupus Street.
" London Gaslight Co.
" Independent do.
" Phœnix do.
" South Metropolitan Gaslight Co.
" Commercial do.
" Imperial do.
" West Ham Gas Co.
" Gas-Works, Royal Arsenal, Woolwich.
" do. Barnet.
" do Lower Sydenham.
" do. Brentford.
" Consumers Gas Co., Woolwich.

The Alliance and Dublin Gas-Works.
" Edinburgh do.
" Manchester Corporation do.
" Salford do. do.
" Rochdale do. do.
" Liverpool Gas-Works.
" Birmingham do.
" Birkenhead do.
" Nottingham do.
" Newcastle-on-Tyne Gas-Works.
" Lurgan do.
" Carmarthen Gas-Works.
" Merthyr Tydfil do.
" Windsor do.
" Leeds do.
" St. Albans do.
" Over Darwen do.
" Rotherham do.
" Aylesbury do.

The Bournemouth Gas-Works.
" Ystrad do.
" Cardiff do.
" Rochester do.
" Keighley do.
" Aberdare do.
" Ballymena do.
" Richmond do.
" Stalybridge do.
" Longton do.
" Exeter do.
" Ross do.
" Falmouth do.
" Barrow-in-Furness do.
" Belfast do.
" Wakefield do.
And other Provincial and Foreign Gas-Works.

IMPORTANT TESTIMONIAL.

The Gaslight and Coke Company (Commonly called the Chartered Gas Company), Beckton, North Woolwich, July 2, 1874.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—In answer to your inquiry respecting the Self-Sealing Lids, I beg to say that they continue to work well, and I have every reason to be satisfied with them.

I should be very sorry to return to the old system of Luting, and our stokers here freely acknowledge the benefit to them of the new system.

I am, yours truly,
(Signed) G. C. TREWBY.

P.S.—We shall have very shortly about 3000 of your Lids in use.

London 1851. New York, 1853 Paris, 1855. London, 1862.

Dublin, 1865.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
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STREET-LAMP METERS,

AND REGULATORS FOR AVERAGE METER INDICATION.

METERS FOR MEASURING WATER.

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TO CORRESPONDENTS.

We repeat the announcement made last week, that communications received later than Saturday, cannot be inserted in the forthcoming No. of the JOURNAL.

THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, MARCH 9, 1875.

Circular to Gas Companies.

On Wednesday last, Sir J. M. Hogg obtained leave to introduce to the House of Commons "a Bill to Amend the Metropolis Gas "Act, 1860, and to make further Provision for Regulating the "Supply of Gas within the Limits of the said Act, and for other "purposes," and, accordingly, it was brought in, and read the first time. Afterwards, Sir Charles Adderley, representing the Board of Trade, gave notice that he should, on a future occasion, move that this and other metropolitan gas Bills be referred to a select committee. This motion is certain to be acceded to, and soon after Easter the campaign will be opened in earnest.

The Bill actually introduced by Sir J. Hogg has been printed, and we now know the exact wishes of the Corporation and Metropolitan Board, who have already secured the services of an engineer and eminent counsel to support their views before the committee. Substantially, the provisions of the Bill introduced are the same as those originally proposed in the first draft of the Bill, and which have already been mentioned. Some alterations have, however, been made, to one of which we drew attention last week—viz., the proposed appointment of one of the referees by the gas companies. We regard this concession as of some importance—not very great, it is true—but we have doubts whether the Board of Trade will, as we said a fortnight ago, consent to relinquish patronage. We are, however, grateful for small mercies, and willingly acknowledge the concession as some indication that the authorities are not actuated by a spirit entirely hostile to the companies. We think that, as a whole, they are rather deluded and mistaken than viciously hostile.

If we were conceited, we should think that some other alterations have been made at our suggestion. Clause 44 has been so altered, that it will not now render half-yearly meetings, for declaration of dividends, impossible. The clause, as it previously stood, was most likely muddled by the blundering of a copyist or the printer, but it was well that it should be set to rights. Then, as regards the application of excess of profits beyond the amount required for dividend, clause 50 is qualified by a proviso which will prevent the unlimited accumulation of divisible profits which the Bill, as originally printed, would have allowed, and is intended to compel their application in reduction of price. The clause, as it stands now, however, is imperfect, and will require attention and amendment.

For the rest, we need only once again recapitulate the points on which there can be no compromise before the committee. Three shillings and ninepence cannot possibly be accepted as the future price of gas. This is a point on which all the companies will be united, for even the directors of the South Metropolitan must foresee that the time is approaching when they will be compelled to raise their price. Thus, one of two courses must be pursued. Either the revision clauses of 1868-9 must be insisted on—and this, as most consonant with the spirit of recent legislation, would seem to be the best course to follow—or, as we suggested last week, we must revert to the maximum prices of 1860. To our mind, the latter course would be preferable, though we consider it probable that even these prices may not be possible in the lapse of a few years. If, however, they can be obtained, they would save the expensive annual contests which must inevitably take place should the revision clauses be adopted, and which are detrimental alike to the interests of gas consumers and ratepayers. It will naturally be strongly represented to the committee that the Corporation and Metropolitan Board of Works in their own Bills proposed no limitation of price, merely stipulating that it should be the lowest possible. Now we believe that the gas companies may be as well trusted to keep gas at its lowest price as the local authorities. As a fact, the former have a far greater interest in keeping down prices than any local authority can possibly have.

Then the testing clauses must be strictly scrutinized. Of course, we do not object to the gas being tested all through the 24 hours. That is a matter for the consideration of the authorities, who cannot expect to have the services of the examiners during the whole day on the same terms that they now get them for a few hours in the evening. We need not stop to repeat our objection to the proposal to take the lowest results of three testings, made within 24 hours, as the actual illuminating power of the gas during the day. The common sense of a parliamentary committee will revolt at the bare mention of such an idea, and the present practice of taking the mean of the results is certain to be confirmed. The burner question must be stoutly contested, so that the selection may be left to the referees from time to time, as circumstances may dictate. For the last few years a majority of the gas Acts passed have prescribed the use of Sugg's "London" burner as the test-burner. But in some the qualifying phrase has been added, "or such other burner as may from time to time be approved "by the Board of Trade." We have already alluded to an improvement of the "London" burner, which, while it enhances the value of the gas, makes the burner capable of more general application. For the present, then, we may contend that this improved burner should at once be substituted for the new "London." But the improvement may not rest here; Mr. Sugg, or some one else, may make a still further advance. To treat a gas-burner as a standard yard measure, and to deposit a specimen with the Warden of the Standards, and bury another, we suppose, within the walls of the Houses of Parliament, for that New Zealander to discover, when he explores the ruins of the still modern Babylon, is the height of absurdity, and the notion could only have emanated from the brain of a vestryman or a common councilman. It would have been as reasonable years ago to have stereotyped any of the now antiquated pieces of gas apparatus which have been described

and figured in our "Treatise." A burner is simply an instrument by means of which the combustion of gas is effected, and we cannot say that we yet know all the conditions under which that combustion may be most advantageously carried on. What we do know is that, the illuminating agents are supplied in the gas, and for these the purveyors of the gas—be they a corporation or be they a gas company—must have full value. On this matter we write in the interest of all gas undertakers. A municipality of London will, perhaps, possess the gas-works in the course of a few years, and we claim for them what we now demand for ourselves—the use, for testing purposes, of the best possible burner.

We passed over just now the proviso which is intended to reduce dividends if the standard price be exceeded. This is a matter on which there can be no compromise, and Parliament, we are confident, will never enact that manufacturers are to be punished because their raw material is dear. If we were allowed 20 per cent. in prosperous times, we might submit with equanimity to 5 per cent. in periods of depression. But if a limit be fixed, 10 per cent., we must contend, is the rate of profit to which we are justly entitled.

There is nothing else in the Bill which we need now notice. Most of the provisions will not be contested, for they are simply designed to bring all the companies under regulations in which the most important have already acquiesced, and to which others, like the Commercial Company, have expressed their willingness to submit. The points to which we have referred above are, however, vital matters, and as regards them all the companies will act in unison. Every one will look forward with great interest to the proceedings before the Select Committee, and, therefore, we may announce at once that they will be found fully reported in our columns.

What the action of the Board of Trade may be is, of course, unknown to us. That they take some interest in the question is clearly indicated by the motion of Sir C. Adderley. The opinions of the permanent officers of the Board are well known, but whether or not it will be attempted to enforce these, we cannot at present say. We expect, however, to hear more of general amalgamation, since the Board of Trade are strongly committed on the point. In any case, we may still hope that arrangements will be come to which will lead to this desirable end.

We must confess to some astonishment at seeing a Bill promoted by the Chartered Company thrown out for want of compliance with Standing Orders. Such a fate has, however, actually befallen the Bill they have brought forward this year. As we announced last week, the Commons Committee allowed it to proceed, with certain modifications. The Lords Committee, however, have proved inexorable, and the Bill is lost. The consequences are not serious to the company. They can go on very well as they are for another year, and wait to see what will turn up in the contest now commenced in earnest, or, may result from other legislation, respecting which we are at present in the dark.

It is only under exceptional circumstances that we "crow over" a want of success on the part of our opponents, and we are somewhat astonished at hearing the Metropolitan Board set up a shout of triumph at the failure of the above Bill, and the premature decease of the bantling brought forth by the Phœnix Company. The Bill of the Chartered Company was essentially in the interest of the Metropolitan Board and Corporation, and their opposition to it affords the clearest evidence that these authorities were never sincere in the promotion of their Purchase Bill. If they had been, they would have allowed the Chartered Bill to proceed, and left the terms of purchase to the arbitration of a parliamentary committee. As it has turned out, the opposition is of no consequence; but, it must be remembered that, it was undertaken before the Government announced that they could not support the measures proposed by the authorities.

We are sorry to see that the Imperial Company are not satisfied with the working of the average meter system in the parish of Paddington. They say that the saving, of which the parish Gas Committee lately boasted, has, for the greater part, resulted from the shortened hours of consumption, and the remainder has been effected at the expense of the Imperial Company. The regulators of the unmetered lamps have been adjusted for a consumption of 5 feet per hour; and it is assumed that these lamps do consume this quantity, and neither more nor less. But the metered lamps, according to which the company charge for gas, only register an average consumption of 4·77 feet per hour. The difference of 0·23 of a foot per hour is ascribed to friction in the meter. We do not know what sized meters the referees prescribed for use in Paddington; but, if a sufficiently large meter is in use, and a good pressure is kept up in the mains, the loss by friction must necessarily be exceedingly small. We are very sorry to see this difference of opinion, because, in almost every instance, the average meter system works to the satisfaction of both parties. At Nottingham, the gas company never made any complaint, and at Sheerness, as our correspondence has shown, the gas company rejoice at the introduction of the system. If the Imperial Company can show good grounds for dissatisfaction, the referees will no doubt make an allowance for "friction" next October. In the meantime, we can only hope that a system, which has given satisfaction in almost every case in which it has been applied, may receive a fair trial in Paddington.

A curious dispute has cropped up between the Imperial Company and the parish of St. Pancras. It is alleged that the company have for the last twenty years charged for twelve more public lamps than are, or have been, in existence. How such an error could have been committed, it is almost impossible to conceive; but that it should have continued for twenty years, is clearly the fault of the parish officials who are concerned in making the contracts.

The Town Commissioners of Tunbridge Wells and the gas company have, we are happy to see, come to terms. It has been arranged that the maximum price of gas shall be determined by the cost of coal as delivered at the works. The other matters of less importance which have been arranged will be found mentioned in another column. By this friendly agreement an expensive contest, that would have done good to no one, has been avoided, and now we hope that the commissioners and the company will go on amicably, to the advantage of both parties.

We think we are justified in stating that the Corporation of Southampton and the gas company have agreed on the terms of purchase and sale, and thus another parliamentary fight is avoided. What the terms agreed upon are, we are not yet informed; but the condition of the company warrants us in believing that the ordinarily accepted price has been secured.

The gas accounts of the Corporation of Bolton show a very successful year's working. They have—happily, we say—no balance to carry to the borough funds account; but they are able to make substantial additions to their renewal and reserve funds, while supplying gas at 3s. 4d. per 1000 feet. London consumers need not be envious; Bolton is well situated for getting gas coal at a cheap rate.

The Corporation of Hereford have been scarcely so successful with their undertaking, since the profits are not equal to the payment of interest and the instalment of principal due. The deficiency, however, is only about £200, which will have to be made good from the city fund. It is clear that the undertaking is in a healthy state, for consumption and profits, go on increasing every year. The works, too, are evidently in a good condition, but the amount of unaccounted-for gas (14 per cent.) ought to be reduced.

The Improvement Commissioners of Cheltenham are going to law with the gas company, to have it decided what is the proper apparatus for the determination of "sulphur," there being a hopeless disagreement on this point between the company's manager and the commissioners inspector. We hope we may assume that the company understand their own Act, and have provided all the necessary instruments.

Dr. Cross is about to propose that the Corporation of Liverpool shall sue the United Company for £6647, the difference between the amount paid by the Corporation for gas last year, and the estimated value of the gas, according to the returns of illuminating power made by the Corporation examiner. If the Town Council agree to the motion, and proceedings be taken, they will be of considerable interest to gas companies.

If an inventor can only make a friend of a reporter, or, better still, of an editor of a provincial newspaper, he can make a great sensation in a small world. He may, for example, get something like the following put forth in a leading article:—

The "philosopher's stone," so eagerly sought after for years by chemists and manufacturers of gas, has been at length discovered by a M. François Lenoir, a native of Belgium, who, though in humble circumstances, has, after years of experimentalizing, discovered a process by which the brilliancy of gas may be intensified to a surprising degree, and at the same time in such a manner as to ensure a large amount of economy to the consumer.

The philosopher's stone would appear to be a simple carburetting apparatus, in the use of which the intelligent writer of the article we quote from, sees the means of "shaking off the thraldom "under which Hull has been so long groaning." Of course, all creation is anxious to have the immediate use of this priceless invention; but, at present, the glory and distinction is reserved for Hull alone:—

It is not (says the able editor) to be supposed that the gas proprietors will favour the movement in the least, and for obvious reasons. Nor would we, for the public sake, counsel that the patent should be so monopolized. If it is of any advantage at all, let the consumers participate in it; and if they will only be true to themselves, and, by the adoption of this process, resist the exactions of the companies, the proprietors are ready to co-operate with any company formed, taking their share of the profits when profits are derived, and not, as is usually the case, demanding a fabulous sum in the way of licence or royalty. Nothing could be fairer or more straightforward; and it is an offer which the Hull public ought not to allow to glide away.

We fear the JOURNAL OF GAS LIGHTING is usually dull reading, and we are very glad when anything so amusing as the above offers itself for notice.

Water and Sanitary Notes.

We learn, from a reply of the Duke of Richmond to Earl Cadogan, that it is not the intention of the Government to introduce a Bill to acquire a water supply for the metropolis. This, of course, means Government opposition to the measure introduced by Colonel Beresford, so there is an end of that business. As regarded the matter under discussion—the occasional condition of the water supplied by the Chelsea Water Company—the noble duke was not sufficiently explicit. He should have told his illustrious colleagues that if they had not rejected, on purely sentimental grounds, the Bill promoted by the company two years ago, to change the situation of their intake, and construct depositing reservoirs and additional filter-beds, the condition of things complained of might have been prevented, although extension-works of the kind projected are necessarily long in execution. Some good, however, will result to the company from the recent outcry. They will get their Act this year, and we may trust them to push forward the works with the utmost diligence.

Mr. Hawksley and Mr. Bateman have presented to the Water Committee of the Corporation of Liverpool their reports on Mr. Jackson's schemes for an additional water supply. These, our readers may remember, are three in number. One is to appropriate the head waters of the river Wyre, and is known as the Bleasdale scheme, which is most favoured by Mr. Jackson. The other schemes are to bring the water from either Bala or Windermere Lake. We have at present only imperfect abstracts of these reports; but we have enough to show that the eminent engineers named do not agree in their recommendations. Mr. Hawksley is strongly in favour of the Bleasdale scheme, which, he estimates, after allowing for compensation water, would yield to Liverpool about 24 million gallons per day. The cost of the works for a supply of 20 million gallons per day (the principal reservoir being 40 miles from Liverpool) is set down at about £2,000,000. The Windermere scheme, Mr. Hawksley rejects, on account of the expense which would be involved in carrying it out, in consequence of the distance of the source, and the necessity for pumping stations at various points. The Bala Lake scheme he considers feasible, but points out the serious engineering difficulties to be overcome, and the conflicting local interests to be contended with. In concluding his report, Mr. Hawksley urges on the Corporation the necessity for prompt action, since works are long in course of construction, and in a very few years the present supply of water will be inadequate to the wants of the increased population.

Mr. Bateman objects to the Bleasdale scheme for various reasons. He considers that much of the gathering-ground is already appropriated for the supply of other towns, thinks that the works would take nine or ten years to complete, before a gallon of water could be conveyed to Liverpool, and that the cost would considerably exceed £2,000,000. In the abstract of Mr. Bateman's report before us, no mention is made of the Bala and Windermere schemes. The reporter is, however, quoted at some length in support of his favourite scheme, for the supply of Liverpool and Manchester from Ulleswater Lake, which, he tells us, is at a sufficient elevation to supply both these cities by gravitation. The only formidable engineering work would be a tunnel under Kirkstone Pass, about 8½ miles long. The rest of the work, in an aqueduct 79 miles in length, offers no difficulties. He proposes to bring a common aqueduct to a spot near Chorley, 79 miles from Ulleswater, and about equi-distant from Liverpool and Manchester. Then he would divide the stream, and distribute the water equally between the two cities. The total cost of the works is estimated at about £2,500,000, and the supply of water obtainable is considered to be sufficient for generations to come.

When we get these reports in full we may make some further allusion to them. In the meantime, we fear that when the Corporation of Liverpool take them into consideration, they will be rather perplexed by the conflicting recommendations made to them.

The accounts of the metropolitan water companies for 1873-4 have just been issued, and we hope to give our usual abstract in the next number.

Abingdon Gaslight and Coke Company, Limited.—The twelfth annual general meeting of this company was held on the 4th inst., the chairman of the company, Mr. E. S. Copeland, presiding. The report and balance-sheet was unanimously adopted. A profit of £1181 10s. 6½d. had been realized during the past year, which sum added to £515 10s. 6d. from last revenue account, gave a total of £1697 1s. 0½d. available for distribution. Upon the motion of Mr. W. Pemberton, seconded by Mr. Councillor Townsend, a dividend at the rate of 10 per cent. was declared (free of income-tax). £200 was added to the reserve-fund, carrying £497 1s. 0½d. forward to next year's account, and it was resolved to reduce the price of gas on the 1st of April next, 5d. per 1000 feet. The directors retiring by rotation—Messrs. J. Tomkins, Cox, and Townsend—were re-elected, as were also the auditors, Messrs. R. Wells and C. Glanville. Votes of thanks were unanimously given to the directors and auditors. The chairman spoke in the highest terms of their secretary and manager, Mr. John Ely, as did also Mr. Councillor Cox and others, to whom a vote of thanks was heartily given. A unanimous vote of thanks to the chairman concluded this very pleasant meeting.

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

LIV.

Gasholders.

According to Peckstone's "Theory and Practice of Gas Lighting," published in 1819, the gasholders generally employed at large works varied from 15,000 to 20,000 feet in capacity. The author recommended either cast-iron or wooden vats for the tanks, but suggested the greatest care in the construction of the latter. We learn, from this work, that John Malam contributed largely towards the improvements in the construction of cylindrical gasholders, by dispensing with the heavy internal framing, in applying counterbalance weights and chains for relieving the pressure, and guiding the holder by a centre rod and tube. The last system was extensively adopted in gasholders for small works, many of which, are still in existence. Referring to the construction of holders, Peckstone says: "Experience has now taught the manufacturer that he cannot construct the gasholder too light. Instead of the wooden frame or weighty iron stays, that vessel consists now of nothing save the plates riveted together, and an angle-iron at the bottom, and another angle-iron inside at the top, for keeping it in form, together with six or eight small rods, which project from the eye-bolts, by which the gasholder" (meaning, no doubt, the roof) "is suspended. Under this arrangement the gasholder is light, and consequently costs much less in the first instance; it requires less balance-weights, lighter friction wheels, and, in short, under all its bearings, it is attended with benefits."

The foregoing opinion of Peckstone is similar to that generally acted upon by engineers at the present day, in the construction of gasholders, where strict economy is observed—that is, to dispense with all superfluous material in the trussing of the roof, and to place all the available metal in the sides and top of the holder, on the strength of which the durability of the vessel entirely consists. Indeed, some engineers have constructed these apparatus without any trussing whatever, but the success of this plan, on several accounts, is somewhat doubtful. In direct opposition to Peckstone's opinion, the author of a standard work on gas lighting, when detailing the iron necessary to be employed in a gasholder, allows less than one-half of the total weight for the sides and top sheets (which really constitutes the holder), the greater portion of the metal being distributed as stays, diagonals, and trusses. This is beyond all question erroneous, for all that is requisite is to have sufficient trussing to support the weight of the roof, but when the holders are of great depth, or of large diameter, suitable vertical struts are desirable to support the sides. For these purposes, about one-fifth or one-sixth part of the gross weight of the holder will generally be sufficient.

Brick tanks were first constructed about 1818, since which period other material, as stone of various kinds, and Portland cement concrete, have been introduced with very marked success, and such is the state of perfection now arrived at in the erection of the vessels under consideration, that there are many built tanks, each of which contains tens of thousands of tons of water without the slightest loss or leakage, they being, as the phrase goes, "as tight as a bottle."

Vast improvements have been gradually introduced in the construction of gasholders, by the introduction of the telescopic principle, both single and double lift, of which one or more excellent specimens will be presented; whilst the magnitude of these vessels, both single and telescopic, has far exceeded the most sanguine expectations of Samuel Clegg, when he asserted the possibility of their being constructed equal in diameter to the dome of St. Paul's Cathedral. It may be added that the design and execution of the majority of these stupendous vessels reflect the highest credit on the engineers by whom they were designed and constructed.

As the question of pressure is of the utmost importance, and must naturally be referred to, it may not be inappropriately introduced at present, the more particularly as it has immediate relation to the apparatus under consideration.

This pressure or force is obtained by the gas, as generated, assuming a volume vastly greater than the coal from which it is derived—the former being from 200 to 400 times greater than the latter; depending on the kind of coal distilled; and if, during its production, the gas were to be retained in a hermetically closed vessel, it would speedily acquire a degree of force or pressure sufficient to destroy the distillatory apparatus. In the operation of gas manufacture, the process is directly the opposite of this, for the gas, as produced, is stored in holders under very light pressure, and for the purpose of economy, the lighter this is the better, so long as there exists a sufficiency for the supply. One of the great advantages possessed by gas is the remarkably low pressure requisite for its distribution and consumption. For the latter purpose, 5-10ths only is sufficient for bat's-wing and fishtail burners, and considerably less than that is required for well-manufactured Argand burners. When the mains are of ample capacity, and the district supplied level and compact, a pressure of 1½ inch at the works should be ample, that in the holders being but little in excess of this; the nature of the gas company's district must, therefore, govern the construction of the gasholders.

The pressure of gas within a holder is controlled by the weight and relative area of the top of the vessel. When of small diameter, and constructed of sheets of the ordinary thickness (for the purpose of reducing the pressure within them), gasholders are generally provided with counterbalance weights, suspended to chains, which pass over pulleys. By this means the holder can be weighted to any desired pressure, and this should always be taken advantage of. In those of medium size, of from 70 to 100 feet in diameter, no such counterbalance weights are necessary, as, for reasons hereafter explained, the holder

is sufficiently light without them. In gasholders of the largest magnitude it becomes necessary to augment their weight in order to obtain the desired pressure; this is usually accomplished by increasing the thickness of the sheets forming them. In some of these holders the thinnest plates used in their construction are of No. 8 gauge, each square foot weighing no less than 7 lbs., and when we consider the greatly increased durabillity of sheet iron by any slight augmentation of thickness, the duration of these large holders may be practically stated to be unlimited.

For the purpose of appreciating the pressure existing at any part of a gas-work or in the mains, &c., the pressure-gauge, represented in fig. 1, is employed. This, in its simplest form, consists of a glass tube of about five-eighths of an inch internal diameter, bent as represented, half filled with water, having the scale in the centre divided into inches and tenths of inches. The part *a* being in communication with the gas, the water is depressed therein, and elevated in *b*, according to circumstances, the distance between the two levels indicating the pressure, which, up to 3 or 4 inches, is generally described in tenths; from that point the term "inches" is applied.

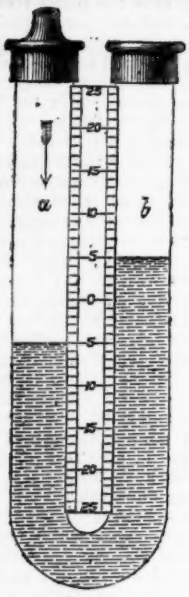

Fig. 1.

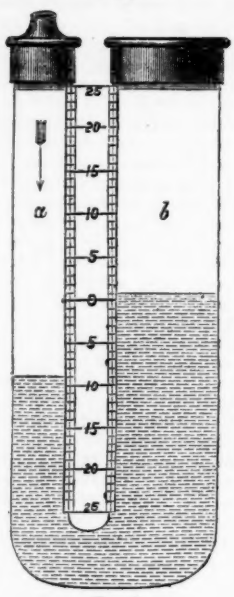

Fig. 2.

In the gauge described, where both tubes have the same area, the depression of the liquid in one tube is equal to its elevation in the other; but when two tubes of unequal diameters are employed, the depression and elevation of the liquid is according to their respective areas. Fig. 2 represents a gauge in which the area of the tube *b* is nine times greater than *a*, both being, as before mentioned, half filled with water. If we suppose the gas to enter the tube *a* at a pressure of one inch, the water would be depressed therein nine-tenths of an inch, and elevated one-tenth in *b*, thus indicating the inch pressure. On reversing the action, and allowing the gas to enter *b*, the water in that tube would be depressed one-tenth, and elevated nine-tenths of an inch in the other. In both illustrations the tubes *b* are supposed to be open to the atmosphere at top, the gas entering at *a*, as indicated by arrows. The explanation of these details is essential for future reference.

At one period, when the baneful effects of heavy pressure in a gas-work were not understood, it was by no means unusual to find a pressure of 30, or even 40 inches, in some works, occasioned at times by small mains, defective purifiers, or stoppages. In these cases, mercurial pressure-gauges were employed, which were similar to fig. 1, but with tubes of only about one-quarter of an inch in diameter, and as mercury is about fourteen times heavier than water, these gauges were made of proportionate length. Thus, a column of 30 inches of water would be substituted by a mercurial gauge of $2\frac{1}{8}$ inches; but with our advanced knowledge, such pressure rarely, if ever, exists in gas-works at the present time; the mercurial gauge is, therefore, no longer in requisition. Various other descriptions of pressure-gauges are employed, some of them of an ornamental character. To these, for the present, we will not refer.

In the first gasholders the large quantity of wood framing which entered into their construction, when immersed, acted as a float, and when out of the water acted as a weight, naturally causing great irregularity in the pressure of these vessels when in action, particularly as their dimensions were very limited. This inconvenience gave rise to various plans, with the view of counteracting the evil. In some instances floats were placed within the holder, or wooden curbs around its lower edge; but as these only tended to lighten the whole of the apparatus to a very slight degree, no useful result was derived therefrom. As will be hereafter shown, the difference in the pressure with a single holder, when nearly empty or full, is but very slight, and, practically speaking, not to be regarded.

(To be continued.)

Reductions in the Price of Gas.—The Abingdon Gas Company have resolved upon a reduction of 6d. per 1000 cubic feet from the 1st proximo. The directors of the Wakefield Gas Company, "suffering from an excess of cash," promise a reduction—to what extent not stated—in July next.

Correspondence.

MR. MANN'S PATENT FOR "SULPHUR" PURIFICATION.

Sir,—But for Mr. Mann's letter, I should have thought that the purport of the few sentences which I devoted to his patent was sufficiently obvious. I showed that there is a fundamental error in the very first stage of the process, which vitiates the whole of it. Mr. Mann passes crude gas, which contains from two to three times as much CO_2 as SH_2 (the CO_2, moreover, having a greater affinity for alkalies than SH_2 has), into a lime purifier, and then says that the lime is converted into sulphide of calcium, whereas he only thereby produces "foul" lime, in the ordinary state of saturation. Indeed, by his process, even when worked in the best possible manner (for which he gives no directions), the lime is only about one-fourth part sulphuretted—in other words, there is only a small portion of sulphide of calcium, diluted (so to speak) with three times its volume of carbonate of lime, a substance which is utterly useless for purification, being incapable of absorbing sulphur in any form, or any other impurity.

If any definite proof were wanted of the absence of knowledge as to the right way of using lime for "sulphur" purification, previous to my own invention, this patent of Mr. Mann's would supply it. It fully illustrates the grand mistake which previously prevailed of ignoring the injurious effect of CO_2 in the gas, and of imagining that "foul lime was sulphide of calcium, an error which was displayed on the grandest scale at Beckton, where (as shown in Mr. Trewby's own daily records supplied to the referees for publication in their Beckton report) the lime was kept in the purifiers for 9 and 10 days *after it had become foul*—in other words, for 8 or 9 days after it had become carbonated!—the result, of course, being, as Mr. Trewby himself wrote to the referees, and as was painfully manifest from the *official* testings, that "the lime was not removing a particle of the bisulphide of carbon."

Moreover, although I took no notice of this matter in my previous letter, I may now mention that a similar error is committed by Mr. Mann in the second part of his patent, which relates to the employment of gas liquor. He here illustrates another old mistake by patenting the use of "strong (say 30-oz.) gas liquor" as a means of "sulphur" purification. As I was the first to point out, and as is now universally admitted, this notion of purifying for "sulphur" by strong gas liquor is utterly wrong, seeing that the stronger the liquor the more highly is it carbonated. The numerous and carefully conducted experiments of the referees (published in our "First Sulphur Report," 1870), demonstrated that ordinary gas liquor has no effect whatever in taking out the "sulphur." Various kinds of scrubbers, and the modes of scrubbing employed in the various works of the Chartered, Imperial, and South Metropolitan Companies, were included in these experiments, with the result above mentioned. Nevertheless, ordinary gas liquor must be better (or rather, if possible, not so entirely useless) for this purpose than the "strong 30-oz. liquor," for which Mr. Mann takes out this patent, seeing that, as already said, the longer the liquor is kept in contact with the gas (which is the only way of increasing its strength), the more does it become carbonated by the CO_2 expelling from the liquor the SH_2, which had at first been absorbed along with CO_2.

Hence, I repeat, Mr. Mann's patent only shows in a most striking and definite manner the erroneous ideas which used to prevail in this branch of gas purification, but which are now entirely abandoned, the new system, devised by myself, being, as stated by the author of the "Treatise on Gas Manufacture," appearing in your Journal, an "entire reversal" of the old.

21, *John Street, Adelphi.* R. H. Patterson.

THE PLYMOUTH GAS COMPANY.

Sir,—Your issue of the 23rd ult. contains a report of the proceedings at the annual meeting of the Ipswich Gas Company, held on the 15th Feb., at which the manager, Mr. Goddard, is reported (in reference to the low price charged for gas at Plymouth) to have said: "It so happened that a railway company required the property held by the Plymouth Gas Company, and paid them a very large premium for it, and rebuilt their works. This gave the gas company a large amount of capital which was not dividend-bearing, and they could therefore manufacture gas at a much cheaper rate than other people." For the information of yourself and your numerous readers, I beg to say that Mr. Goddard has committed a great mistake in making such a statement, there being no foundation whatever for such an assertion. This company have never sold, and consequently have not received any premium from a railway company for any portion of their works.

G. Henderson, Secretary.

Plymouth and Stonehouse Gaslight and Coke Company.

GAS FROM FŒCAL MATTER.

Sir,—Will you allow me to direct your attention to a paragraph inserted in the *Press and St. James's Chronicle*, on Saturday, Feb. 20, 1875, under the head "Science"? It states that a Mr. Sindermann has made known to the authorities of Breslau that he manufactures illuminating gas from sewage matter and mud on one of his estates, &c. I think I am right in saying that this mode of obtaining illuminating gas has been long known, has been thoroughly examined and discussed, and that the conclusion, as to its practicability for the economical lighting of towns, is unfavourable. I should, however, feel greatly obliged if you would kindly supply a brief statement of the view taken by any of the highly competent scientific staff at your disposal. I ask this in the interest of the public, for I should not be at all surprised to find that the paragraph to which I have referred is made the basis of a project for another great company to be added to the list of ruinous schemes which have already devoured so many victims under the head of "new gas production."

Of course, if it can be shown that a supply of gas for the economical and efficient lighting of towns, or parts of towns, can really be derived from the sewage, all gas companies will be only too happy to avail themselves of the process.

Cambridge, March 1, 1875. Robert Phelps.

[The information given in the *Press and St. James's Chronicle* is perfectly correct. Herr Sinderman is making experiments at Breslau, with what result has not yet, so far as we know, been published. The smallest consideration will show that the manufacture of illuminating

gas from dry fœcal matter, which is what Sindermann uses, is a delusion. Gullible as some investors are, we doubt whether any will be found sufficiently so to put their money in a concern for producing fœcal gas.—Ed. J. G. L.]

BARNET DISTRICT GAS AND WATER COMPANY.

Sir,—Please oblige me by correcting in your next number a misprint in your report of what I said at the meeting of this company.

I am reported as having said, "There had been a consumption of 26 or 28 per cent. of the coke made, and this might be largely reduced." What I did say was 36 or 38 per cent. R. P. Spice.

21, *Parliament Street, Westminster, S.W., March* 4, 1875.

FORM OF GAS COMPANIES ACCOUNTS.

Sir,—I have often observed, in the statements of accounts issued by gas companies, that while some place the expenditure of capital to the debit of capital account, and credit it with receipts, others do exactly the opposite. I follow the first method, but can scarcely explain why. Perhaps some of your readers will kindly tell me which is the correct method, and also explain the theory of the matter. A. B.

March 4, 1875.

Steam Jet Exhausters.—Mr. Cleland desires us to say, in reply to Mr. Young's letter, in the last number, that he is aware jets of steam have been used for many purposes for many years; for instance, for withdrawing steam from the cylinders of steam-engines, for ventilating mines, improving the draught of chimneys, &c., &c.; but the conditions surrounding these are altogether different from those existing in the manufacture of gas for heating and illuminating purposes.

Parliamentary Intelligence.

HOUSE OF LORDS.

Monday, March 1, 1875.

Petitions against the South Staffordshire Water Bill were presented from (1) Corporation of Walsall, (2) Corporation of Dudley.

METROPOLIS WATER SUPPLY.

The Earl Cadogan, in rising to ask whether it was the intention of Her Majesty's Government to take any steps or introduce any measure, during the present session, with a view to obtaining a better and purer supply of water for the metropolis, said he did not think their lordships who resided in the district supplied by the Chelsea Water Company could have any doubt whatever as to the bad and impure condition of that water. The Local Government Board had been applied to on the subject, and had sent an inspector, who reported on the 8th of December that the water was not only dirty, but that it contained living organisms and insectivora. Dr. Price had been asked to inspect the water, and he had reported a few days since that it was in a very unwholesome state; but so long ago as the 12th of July last, Mr. Burnard Holt had reported to the board that the water was very bad. He was quite aware that that company had introduced a measure with the object of improving the water supply; but he thought their lordships would agree with him, that the mere possibility of the recurrence of such a state of things ought not to exist. He would not enter into the question of whether the water could be taken from a higher or purer source, or whether the present supply could be rendered reliably safe, but he was afraid they could get no security in this matter until drinking water could be drawn from a source perfectly pure. He was quite sure that the water companies entertained an earnest desire to grapple with the difficulties of the question. He thought that this important subject of water supply could not have escaped the attention of Her Majesty's Government, and he hoped that the Duke of Richmond would be able to afford some information upon the subject which would be satisfactory.

Lord Belper said that as he resided in the district of Chelsea, he could bear testimony, from his own experience, that the water supplied was unfit for consumption, and he was quite convinced that some pressure should be brought to bear upon the question.

The Duke of Richmond said, in answer to the question put by his noble friend as to whether the Government proposed to take any steps to introduce a bill for a better and purer supply of water to the metropolis, he would venture to suggest that it was a very large question, because it really meant whether the Government intended to take over all the water companies of the metropolis. He must say at once that it was not the intention of the Government to introduce a bill to acquire the supply of water to the metropolis. With regard to the Chelsea Water Company, the attention of the Local Government Board had been directed to the very impure condition of the water, and they had entered into communication with the company. The result was that the company had introduced a bill to improve and provide a better supply of water, and until it was before them they could not judge of its merits. Without wishing to say anything on that subject, he would simply state that, as they proposed to take the water from a higher part of the river, and to construct a reservoir, he presumed that it would not only be purer, but that there would be an additional supply. He hoped that it would make the water much better than it was at present, and he assured the noble lord that, living in the district, he felt quite as much interest, in obtaining a purer supply of water, as any of their lordships could.

Tuesday, March 2.

The following resolution, reported from the Standing Orders Committee, was agreed to:—"That the Standing Orders not complied with in respect of The Gaslight and Coke Company Bill ought not to be dispensed with."

Petitions against the South Staffordshire Water Bill were presented from (1) Earl Sydney and the Marquess of Anglesea, (2) London and North-Western Railway Company, (3) Local Boards of Health of Oldbury, Rowley Regis, Smethwick, and Lower Sedgley, (4) Cannock and Rugeley Railway Company, (5) West Bromwich Improvement Commissioners, (6) E. W. Burnett.

Thursday, March 4.

The Barrow-in-Furness Corporation Bill was referred to a Select Committee, consisting of the Duke of Bedford (chairman), Lord Thurlow, Lord Ross, Lord Foxford, and Lord Strafford; to meet on Tuesday, March 9.

HOUSE OF COMMONS.

Monday, March 1.

The following bills were read a second time and committed:—Blackburn Water; Market Rasen Water; Pontypridd Water.

The further Standing Order, applicable to the Chelsea Water Bill, has been complied with.

Petitions against the Longwood Gas Bill were presented from (1) William Edwards Hirst and others, (2) London and North Western Railway Company.

METROPOLIS GAS BILL, 1875.

Sir James Hogg gave notice of his intention, on the following day, to move for leave to bring in a bill to amend the Metropolis Gas Act, 1860; to make further provision for regulating the supply of gas within the limits of the said Act; and for other purposes.

Tuesday, March 2.

A petition for an additional provision in the Rochdale Improvement Bill was referred to the examiners of petitions for private bills.

The following resolution, reported from the Standing Orders Committee, was agreed to:—"That, in the case of the Longton Gas Bill petition for additional provision, the Standing Orders ought to be dispensed with. That the parties be permittted to introduce their additional provision accordingly, if the committee on the bill shall think fit; provided that proof be adduced that all the owners and occupiers of property in Blythe Marsh and Forsbrook have assented to the proposal that these places should be included within the limits of supply. That the committee on the bill do report how far such order has been complied with on the report of the bill."

The additional Standing Order, applicable to The Gaslight and Coke Company and Longwood Gas Bills, has been complied with.

A petition against the Chelsea Water Bill was presented from Lambeth Water-Works Company.

Requisitions to withdraw their petitions against the Hindley Local Board, and Ossett-cum-Gawthorpe Local Board Bills, were lodged from London and North-Western Railway Company.

The Bath Gas; Carmarthen Gas; Truro Water; Pontypridd Water; Neath District Water; and Newport (Monmouthshire) Gas Bills were referred to a Select Committee, consisting of Admiral Egerton (chairman), Mr. Assheton, Viscount Newport, and Mr. Hope-Johnstone; to meet on Tuesday, March 9.

The Ashton-in-Makerfield Local Board; Hindley Local Board; Barton, Eccles, Winton, and Monton Local Board of Health; Ossett-cum-Gawthorpe Local Board; Pemberton Local Board; and Widnes Local Board Bills were referred to a Select Committee, consisting of Mr. Bathurst (chairman), Lord Randolph Churchill, Mr. Maitland, and Sir Arthur Mouck; to meet on Wednesday, March 10.

The British Gas Company (Norwich Station); Leicester Water; Oxford (Corporation) Water; and Colchester Gas Bills were referred to a Select Committee, consisting of Mr. Julian Goldsmid (chairman), Lord Rendlesham, Mr. Edward Stanhope, and Mr. George Elliot; to meet on Thursday, March 11.

Wednesday, March 3.

The Eastbourne Water, Slough Water, and Longton Water Bills were read a second time, and committed.

METROPOLIS GAS BILL, 1875.

Sir J. M. Hogg moved for leave to bring in a bill to amend the Metropolis Gas Act, 1860, to make further provision for regulating the supply of gas within the limits of the said Act, and for other purposes.

The motion was agreed to without discussion, and the bill was subsequently brought in, read the first time, and referred to the examiners of petitions for private bills.

Sir Charles Adderley gave notice that, after the second reading of the Metropolis Gas Companies Bill, he will move that it be referred, together with the Commercial Gas, The Gaslight and Coke, and Imperial Gas Companies Bills, to a Select Committee, three to be nominated by the House, and two by the Committee of Selection.

The *locus standi* of the Leeds and Liverpool Canal Company, as petitioners against the Hindley Local Board Bill, has been disallowed.

Thursday, March 4.

The further Standing Order, applicable to the Imperial Gas Bill, has been complied with.

Petitions against the Chelsea Water Bill were presented from (1) Susannah Gill and Isaac Holden, (2) Hannibal Speer, (3) Metropolitan Board of Works.

Requisitions were lodged to withdraw their petitions against the Birmingham and Staffordshire Gas Bill by inhabitants of Birmingham and neighbourhood; and against the Stockton and Middlesbrough Water Bill by Darlington Iron Company, Limited.

Friday, March 5.

Petitions against the Chelsea Water Bill were presented from (1) East Molesey Local Board, (2) London and South-Western Railway Company, (3) Inhabitants of Thames Ditton and neighbourhood.

Requisitions to withdraw petitions were lodged by Great Northern Railway Company, as against the Osset-cum-Gawthorpe Local Board Bill; and by the Corporation of Dewsbury, Batley, and Heckmondwike, as against the Wakefield Water Bill.

CHELSEA WATER COMPANY.

On the order of the day for going into committee of supply,

Sir C. Dilke rose to put a question to the President of the Local Government Board in reference to the powers in existence to check the supply of bad water by the metropolitan water companies. He said: I rise to put a question in a very few words about another metropolitan subject. It was brought under the notice of the medical officers of the south-west of London, about a month or six weeks ago, that the water supplied to the inhabitants of that district, and especially in the parishes of Chelsea and Westminster, was virtually in an unfiltered condition, and very turbid, and upon inquiry it was found that great floods had taken place, not only in the Thames, but in the river Mole, a small river running into Molesey Lock, just above the Chelsea Water Company's works. So large an amount of mud was brought down, that the filters of the company became thrown out of gear, and the company found themselves forced to pump water which was for all practical purposes unfiltered. It was full not only of clay, but of impurities of every possible kind. Well, the company were applied to on the subject, and they pointed out that they had a bill two years ago before Parliament for making a new reservoir higher up the river, but that that bill had been thrown out, and they were about to introduce into Parliament another bill, which they have since introduced, by which they propose to make a new reservoir somewhere above Molesey Lock, by which they hoped if not entirely to avoid all chance of these impurities in future, at all events to make it far more likely that they will happen in the future in the way in which they have happened in the past. But the fact that the water supply to the West-end of London for three weeks was of so bad a quality, and that the companies are unable to positively state that nothing of the kind can happen in the future, but only that the inconvenience will in all probability be considerably lessened, and the further fact that other companies have supplied water quite as bad to other parts of London, has naturally drawn the attention of inhabitants to the state of the law on the subject, and of the power of the water companies to deal with this state of things. Now, the Act which was passed in the last Parliament—the last water companies Act—contains a passage in the preamble, stating that one of its objects is to secure the supply of pure and wholesome water to the inhabitants; and in sections 31, 35, and 36, there are provisions for inquiry, and a reference to the older water companies Act of 1852 as to the nature of the inquiry and its conditions. Now, the new Act of 1870 or 1871 makes provision for inquiry by the Board of Trade, which was at that time the authority in such matters. That inquiry might have been made under the Board of Trade without, as I understand, any application. There is a power to appoint an inspector, and to cause an inquiry to be held, but there is not, I believe, a penalty for the infringement of the conditions laid down in the preamble, that the water shall be of a pure and wholesome character. In the older Act I find also that there

is no defined punishment of a company for an infringement of the conditions therein prescribed. There are words in the older Act providing that the company shall effectually filter the water supplied to London, and the penalty of £100 is applicable to certain cases of offences under that Act. But the words are vague and general, and do not specify a breach of the Act. What I wish to know is, whether in the first place £100 penalty is to be paid in case of an infringement, and also whether there is any instance of such inquiries having been held, and of a penalty of that kind having been enforced.

Mr. SCLATER-BOOTH: The hon. baronet has very clearly stated the law on the subject. I am aware that the Local Government Board, in succession to the Board of Trade, are guided by two Acts of Parliament, the first passed in the 16th and 17th of Victoria, and the other is the water companies Act of 1871. The powers of inquiry of the earlier Act of 1852 are to be exercised upon complaint of the inhabitants. The powers under the latter Act may be exercised on any case of complaint. In the earlier Act a fine of £200, and of £100 a month, upon a water company may be inflicted; and I am not aware that it has ever been inflicted in any case—certainly not in any case that has come under my knowledge. At the same time, I by no means subscribe to the doctrine which has been laid down by the hon. baronet. The circumstances of the case are very much as follow:—In December a complaint was made as to the condition of the water, and it was found that the bad condition of the water had been occasioned by unusual floods, which had fouled the river, and rendered it impossible to filter the water properly. A special analysis was ordered to be made by Dr. Franklin, and within a few days an extremely satisfactory report was issued. The Chelsea Water-Works Company did all they could under the circumstances. They informed us, in the first place, that the mischief occasioned by these floods would not have occurred if the additional water-tanks, or reservoirs, which they proposed to construct some time ago, had been in existence. But, as the hon. baronet has stated, their bill for this purpose was thrown out, not in this House, but in the House of Lords. At the same time, if the bill had passed, it would not have been so effectual a measure as the measure now introduced into Parliament, because the intake under that bill would have been below the embouchure of the river Mole, whereas now it will be higher up. Well, it may perhaps be said that although the water companies are doing all they can, and although they have introduced this bill, something should be done to place them in such a position as will render such an occurrence less likely to happen again. Well, I do not know that that is necessary. The object has been to get a pure and wholesome water supply. Under the powers of the two Acts, a very elaborate analysis month by month is made, and I have recently directed not only the analysis furnished by the officers of the company, but also another analysis made by a gentleman who is paid out of the votes of Parliament, and that those analyses should be placed in columns side by side, so that the one may be tested by the other. I cannot say that it has been proposed to inflict a fine under the circumstances, the main object being to get the water properly filtered and properly supplied to the inhabitants, and steps have been effectually taken, as far as possible, to secure that object. It is impossible that works of such a description as are involved in the construction of new water-tanks and new reservoirs can be accomplished without considerable delay. The companies have taken such means as were possible to secure these objects with the least possible delay, and the Standing Orders of Parliament have been suspended to allow them to introduce a measure, which they could not otherwise have done, owing to the lateness of the time. This is the information which I have to lay before the House; and, in reply to the question of the honourable baronet, I can assure him that the powers of the Local Government Board were not only exercised, but that they were thoroughly effectual for the purpose. Whether, in addition, it would be possible for us to go back to the older Act, and inflict a fine, I do not know, but there is no occasion to do so, because we were met by the companies, I must say, in a proper spirit, and they have shown by their conduct that they were desirous of laying out what money was required, and which would be a very large sum of money indeed.

The subject then dropped.

METROPOLIS WATER SUPPLY AND FIRE PREVENTION BILL.

Colonel BERESFORD said: I have to ask leave to introduce a bill for improving the supply of water in the metropolis. I shall not say anything now on the subject, but shall reserve what I have to say for a future occasion.

The motion was agreed to, and the bill for making more effectual provision for a constant supply of water, and for the protection of life and property against fire in the metropolis, was presented, read the first time, and referred to the examiners of petitions for private bills.

SATURDAY, MARCH 6.

Requisitions were lodged to withdraw the Midland Company's petition against the Bath Gas Bill; and the Harborne Local Board's petitions against the Birmingham and Staffordshire Gas, Birmingham Corporation Gas, and Birmingham Corporation Water Bills.

PROCEEDINGS AGAINST THE LIVERPOOL GAS COMPANY.—DESTRUCTION OF THE LANDING-STAGE.—We (*Liverpool Mercury*) understand, upon the most reliable authority, that the Mersey Docks and Harbour Board have commenced legal proceedings against the Liverpool Gas Company, with a view to establish, by due form of law, the liability of that company to pay the entire expense of the reconstruction of the landing-stages which were destroyed by fire on the 28th of July last. Only one week before that date, the newly constructed and enlarged stage—forming a promenade more than 2000 feet long and 80 feet wide, which did honour to the engineering skill of Mr. Lyster, the engineer of the Mersey Docks and Harbour Board—was opened to the public, and for a few days thousands were loud in their praises of the magnitude and completeness of the works. But on the afternoon of the 28th of July a portion of the stage was discovered to be in flames, and in a short time nearly the whole of the noble work was destroyed. It was then alleged that the fire originated underneath the stage, where a gas-fitter in the employ of the Liverpool Gas Company was at the time engaged in the union of some large pipes through which the gas used for the purpose of lighting the stage was to be conveyed. The cost of making good the injury done by the fire will be little short of £130,000, and the question now at issue has reference to the liability of the gas company to pay that sum, or any portion of it, in consequence of the mischief resulting from the alleged negligence of one of their workmen. The subject is a very important one, both for the gas company and for the dock board; and, whatever may be the result, it will strikingly illustrate the importance of employing thoroughly efficient and careful men in the execution of work which may in any degree jeopardize valuable property. At present no public inquiry into the cause of the fire has been held, nor is it known, we believe, whether the conflagration was purely accidental or the result of carelessness. In seeking to fix the liability upon the gas company, all the circumstances attending what was deemed little less than a national calamity will be carefully scrutinized and inquired into; and should the liability of the gas company be established, it is very probable that the amount which the company will be called upon to pay will be settled by arbitration. Unless some arrangement is in the meantime come to, it is probable that the action will be tried at the next Liverpool assize. The question will inevitably create great interest in the town, and already in some quarters speculation is rife as to the effect upon the consumers of gas of a verdict adverse to the gas company.

Legal Intelligence.

LANGBAURGH EAST PETTY SESSIONS.—WEDNESDAY, FEB. 24.

DAMAGE BY A WATER-WORKS COMPANY.

The *Cleveland Water Company* were summoned by the District Highway Board for unlawfully and wilfully damaging the highway between Whitecliff and Lofthouse to the extent of £30, and for neglecting to repair the same, on the 11th of February.

Mr. *Paver*, surveyor to the board, said that the defendants were summoned to that court in respect of the same road on the 3rd of February, 1874, when an order was made for the expenses and repairs. The company had cut a trench for laying pipes along the road over a distance of three-quarters of a mile. They had filled the trench up with clay, neglecting to use any road metalling, and the consequence was that the frost and snow of the winter had caused the road to be cut up in all directions to the amount named.

Mr. LUCAS (of Darlington) for the company, took objection to the proceedings, the company having a lawful right to open the road under the powers of the Water-Works Clauses Acts, whilst these proceedings were brought under the Highway Act, which did not apply. He further objected that under the Water-Works Clauses Act the company were only bound to keep roads in repair for three, six, or twelve months from the time of laying the pipes, according to circumstances, and the longest period had expired.

A fine of £1, with £30 damage and the costs, was imposed. Notice of appeal to the Court of Queen's Bench was given, and a case granted. The bench also ordered the company to pay 10s. fine, £15, and the costs, for similar damage at High Street, Brotton.

BOLTON BOROUGH COURT.—SATURDAY, FEB. 27.

TAMPERING WITH A GAS-METER.

Richard Seville, 7, Duckers Street, was summoned for wilfully preventing a certain gas-meter, the property of the corporation, to register as it should have done between the 5th of February and the 13th. The defendant pleaded guilty.

The TOWN-CLERK (Mr. R. G. Hinnell) represented the corporation, and, in stating the facts of the case, said defendant was formerly in the employ of the gas company, and probably had been enabled to become acquainted with the means by which he could commit this offence. On the 11th ult., about two o'clock in the afternoon, the head meter inspector, while in Duckers Street, observed that the blind of the defendant's front room was down, and the gas was burning at full. He again visited the house after an interval of twenty minutes, when he found the gas still burning. This being in the middle of the day excited Mr. Grundy's suspicion, and on reaching the office he referred to the inspector's book for the record of defendant's consumption of gas, and found that the consumption, according to the last register, from Jan. 4 to Feb. 5, was only 100 feet, which was the consumption of 20 hours gas with one light. On visiting the defendant's house, the inspector found by the position of the meter that it had been tampered with purposely. In the interest of the corporation he (Mr. Hinnell) did not think it prudent to publicly state the process adopted by the defendant in tampering with the meter, as other people would then be made aware of it. The method was very easy, and the detection very difficult, therefore he must press for a heavy penalty.

The BENCH conferred together, after which they said they considered it a very serious offence, and defendant had evidently been defrauding all the ratepayers. He would be fined £5 and the costs, or two months in default.

WESTMINSTER POLICE COURT.—WEDNESDAY, MARCH 3.

(*Before Mr.* ARNOLD.)

INTEREST ON GAS DEPOSITS.

Mr. *Henry Humphrys*, of Doddington Grove, Kennington, was summoned by the London Gas Company for £3 0s. 6d., the amount of gas rent.

Mr. ARTHUR DOVE attended to support the summons, which was originally before the court on the 24th ult.

Mr. *Humphrys* did not dispute the account, but he contended that as the gas company had had £2 of his in hand as a deposit for three years, he was entitled to set off against their claim a charge for interest on deposit at the rate of 5 per cent. per annum. He based his contention on the 16th section of the Metropolis Gas Act, 1860, which provides that if the security given to a gas company be the deposit of a sum of money, the gas company shall pay interest thereon to the consumer at such rate as the magistrate shall determine.

Mr. A. DOVE submitted that the payment of interest on deposits was only obligatory upon the company in those cases in which the consumer and the company not coming to a mutual agreement on the question of security, came before a magistrate to adjudicate upon their differences. The 15th section of the Act said nothing about interest. It enacted that "the owner or occupier, if so required in writing by the gas company or any of their officers, shall, before he is entitled to have the pipes provided and laid, or to have a supply of gas or of meters furnished, give to the gas company such security for the payment of the rate for the gas to be supplied to him, and of the meter-rent for every meter to be supplied to him, as he and the gas company agree on." In the event of the company and the consumer, however, not agreeing, the 16th section provided that the parties should submit the matter to a magistrate, who should fix the security and the amount of interest thereon. In this case the defendant had agreed with the company, and they had not been before a magistrate.

Mr. *Humphrys* said the two sections must be read together. It was a very important question, as the company held something like £200,000 as deposits from consumers upon which they paid no interest.

Mr. ARNOLD at first was of opinion that the security of the 16th section was equally a security as applied to the 15th section, whether the security was agreed upon by the parties, or had to be brought before the magistrate, and he thought that if the intention of the Legislature had been that the interest should only accrue in cases where the magistrate decided the matter, provision would have been made to that effect. Before, however, the hearing was concluded, he intimated to Mr. Dove that on a careful consideration of the clauses in question he was inclined to be with him on the subject.

Mr. DOVE said the matter had been decided before Serjeant Wheeler at the Brompton County Court about six months ago, when the company were sued for the deposit and interest thereon, and the verdict was for the defendants on the 16th section.

Mr. ARNOLD asked if the case was "reported," and, receiving no reply, said he would communicate if possible with Serjeant Wheeler, and further consider the matter, for which purpose he adjourned the case.

At the hearing on Wednesday last,

Mr. ARNOLD said he had not troubled Serjeant Wheeler, because he had found out that the same point had been raised in the Westminster County Court, and that the learned judge there decided in the same way that Serjeant Wheeler was stated to have done. He (Mr. Arnold) confessed that, after carefully reading the 15th and 16th sections of the Act of 1860, he was himself clearly of opinion that it was only in those cases where a magistrate fixed the security, and the security was a money deposit, that interest had to be paid by the gas company. It was evidently so, for the terms of the clause were "the security may, if the magistrate thinks fit, be the deposit with the gas company, or with any person approved by the magistrate, or the prepayment to the gas company, of a sum of money;" and then it went on to say—

"provided that if the security be the deposit with the gas company of a sum of money, the gas company shall pay interest thereon to the consumer at such rate as the magistrate shall determine." That must mean that the magistrate, at the time of fixing the amount of deposit, shall fix the rate of interest; and, therefore, the defendant was not entitled to deduct a sum as interest on his deposit from the amount of gas-rent due to the company, the security having been agreed upon between the parties without an appeal to the bench.

Mr. *Humphrys* said he had been looking into the matter, and he could not find any decision. He believed that this was the first time the point had been raised. He submitted that it was a point in which——

Mr. ARNOLD said he had now decided the case upon the arguments laid before him at the former hearing. If the defendant liked, he might have a case for the Queen's Bench.

Mr. DOVE said he wished to correct a statement made by the defendant on the last occasion. The defendant then said that the company had £200,000 of the consumers money on deposit. He (Mr. Dove) had looked carefully through the books of the company, and he found——

Mr. ARNOLD said he could not go into this question.

Mr. DOVE said the statement had been published, and ought to be corrected if wrong. Upon an investigation of the books of the company, he found that the highest amount they had ever had in hand was at Christmas last, and the sum then was £5255.

Judgment was given for the company.

LIABILITY OF INCOMING TENANT TO PAY ARREARS OF GAS-RENT.

In the last number we reported a case at this court, which was heard before Mr. Arnold on the 27th ult., in which Mr. Meade, landlord of the Crown Tavern, York Street, was summoned by The Gaslight and Coke Company for the sum of £16 3s. 9d., due as gas-rent from Mr. Murray, the former landlord, of whom Mr. Meade had taken the premises by deed for a "consideration" in money, by which, under the company's Act, 1872, he was rendered liable for the arrears in question. At the hearing it was shown that the transfer of the licence was made in the ordinary way, and on the face of the deed it appeared that the "consideration" as between Murray and Meade was £300. The defence, however, contended that although the "consideration" appeared on the face of the deed, no money actually passed to Murray, but went to his creditors, and, in fact, after paying the rent, taxes, &c., and the brewer, there was not enough by £146 to pay the distillers.

Mr. FRIEND, who appeared for the company, submitted that the deed could not be disputed, and apart from the existence of the "consideration" on the face of the deed, there was a receipt on the back of it for £300, given by Murray to Meade.

Mr. ARNOLD thought it very hard upon the defendant, but the Act was law, and although law was supposed to be justice, there did not seem to be much of the latter element in this matter. The Act, however, was imperative, and he must make an order for the amount claimed, with costs.

The defendant having applied for a case for the opinion of the Court of Queen's Bench,

Mr. ARNOLD now said he had reconsidered the matter since the last hearing. On the last occasion, when he made the order on the defendant, subject to the opinion of the Court of Queen's Bench on the matter, he observed that law was supposed to be justice, but, in this proceeding, justice was being sparingly dealt out to Mr. Meade. He had, however, given himself more time since then to reconsider the matter. For the purposes of this proceeding, which was an order in which the defendant could be put on oath and examined (and in this case the defendant really had been), he considered that the court was in exactly the same position as a superior court; and, although it was true that a great maxim of law applied—viz., that the deed executed between Meade and Murray could not be disputed—still there really had been no "consideration," as was necessary to carry out the clause of the Act relied on by Mr. Friend in its integrity, and as the judges of the county courts or superior courts would have the power to exercise an equitable jurisdiction in this matter (and did exercise it in such matters), he should place himself in the same position, and, dealing equitably between the parties, he should reverse his former decision, and now give judgment for the defendant. Mr. Friend could have a case for the court above if he liked.

WORSHIP STREET POLICE COURT.—SATURDAY, MARCH 6.
(*Before Mr.* BUSHBY.)

William Crawford, a gas stoker, summoned the Independent Gaslight and Coke Company for £5 15s. 6d., for three weeks wages, he having been discharged by the company without notice.

Mr. PIKE, solicitor, appeared for the plaintiff, and Mr. MONTAGU WILLIAMS (instructed by Messrs. Drew, Sons, and Jackson) appeared for the company.

It was stated that the stokers in the employ of the company signed an agreement by which 14 days notice was to be given on either side; but that in case of absence from work without leave, neglect of work, or other misconduct, the company should be at liberty to discharge them.

The plaintiff's case was that he was at work for the company on Saturday night, the 20th of February, and left on the Sunday morning; that owing to his having a pain in his stomach during the day he was unable to go to work on Sunday night, and sent his daughter to the works to inform the foreman. His daughter stated that she had given the message to the foreman, and told him that her father was ill, and could not come. He did not go to work on the Monday night; but on the Tuesday night he went at the usual hour, when he was told that he would not be required.

Mr. MONTAGU WILLIAMS said that, of course, it was of the utmost importance that punctuality should be observed by the workmen in the employ of a gas company, and that great loss would be sustained if workmen could absent themselves without giving proper notice, and having reasonable cause for absence. He called Edwards, the foreman of the yard, who stated that he saw the daughter on the Sunday night, and that she said that her father could not come; she did not know why, but he had been out all day. He declared most positively that nothing was said about his being ill. No message was sent of any kind on the Monday night, and his place was accordingly filled up.

It was admitted by the plaintiff that he and others had been absent without leave on the three days following Christmas-day, but this had been overlooked by the company.

Mr. BUSHBY said that no business of any kind could possibly be carried on unless regularity and punctuality were observed by the persons employed, and that in cases of illness and inability to work satisfactory evidence ought to be furnished to their employers. In this case he did not consider that the message sent to the gas-works by the plaintiff was sufficient. He considered that the company were entitled to better evidence that he was in such a condition through illness as not to be able to do his work. The common law on the subject was, that persons absenting themselves from work without giving proper notice, and without just and reasonable cause, forfeited their situations, and any wages that might be then due to them. His judgment would be for the defendants.

COAL ECONOMIZING GAS COMPANY, LIMITED.—A petition for the winding up of this company, by or subject to the supervision of the Court of Chancery, was, on the 27th ult., presented to the Lord Chancellor, by Joseph Rivolta, of 19, Change Alley, Cornhill, London, merchant, a creditor and contributory of the company, and the petition is directed to be heard before the Vice-Chancellor Sir Charles Hall on the 12th inst.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

METROPOLITAN BOARD OF WORKS.

At the Meeting of the Board on Friday last—Sir J. HOGG in the chair—the Parliamentary Committee brought up a report, in which they stated that, with reference to the bill promoted by the corporation and the board for the amendment of the Metropolis Gas Act, 1860, it appeared desirable that the board should be well represented by counsel. The committee had accordingly authorized the solicitor to retain Mr. Cripps, Q.C., and Mr. O'Hara upon all the bills; and upon all, with the exception of the Commercial Gas Company's bill, it was proposed, having regard to the importance of the subject, that a second Queen's Counsel should be retained. The solicitor had been instructed to confer with the City Remembrancer as to who this additional counsel should be. The committee had further instructed the solicitor to retain Mr. G. W. Stevenson, the gas engineer, as a witness for the board upon all the bills.

Mr. NEWTON, in moving the adoption of the report, said that since the Parliamentary Committee met there had been an important alteration on this question by the throwing out of the bill of The Gaslight and Coke Company by the Standing Orders Committee of the House of Lords. This would very much lessen the expenses of the board in regard to their parliamentary proceedings. It would be remembered that he had characterized that bill as very extravagant and audacious. It proposed to authorize the company to purchase collieries, and to enter upon the manufacture of gas products, and to do other things not at all connected with the business of gas-making, but upon the capital invested in which the consumers would be responsible to make up a 10 per cent dividend to the company. He was bound to say that through the ability and perseverance of the law adviser of the board, and especially he ought to mention their parliamentary agent, Mr. Shrubsole, that bill was rejected, as was the Phœnix Company's bill previously. The board could not over-estimate the value of these proceedings. Those who represented the south side of the metropolis viewed with great satisfaction the throwing out of the Phœnix Bill, which was effected by the energy of Mr. Shrubsole as against Mr. Baxter; and he was sure the members generally would be gratified at the rejection of the Chartered Bill, which was effected by the same gentleman as against Mr. Wyatt. The board might be congratulated on the saving of money thus effected, as they would have had to oppose the latter bill at every stage.

Mr. LESLIE: I should like to ask under what statutory powers this board is authorized to spend the ratepayers money in questions relating to gas?

Mr. NEWTON: The board, under the Standing Orders of both Houses of Parliament, have been made the local authority for dealing with this question.

Mr. RICHARDSON: The board are made the local authority by statute.

Mr. NEWTON: In dealing with the gas companies before the Board of Trade Commission that is so; but I am speaking now about going to Parliament to oppose gas bills; this board have been recognized as the local authority in all these cases. I may say that the question of the board's position has been challenged before committees of the House of Commons, and in every case the board have been able to maintain their *locus standi*.

Mr. LESLIE: We had one bill—a very much more expensive bill, for establishing an independent supply of gas—and that bill the board have withdrawn.

Mr. NEWTON: That bill is not before us now.

Mr. LESLIE: Then there was a second bill, for purchasing the gas companies, and that was ignominiously kicked out of the House. (Order.)

The CHAIRMAN: The honourable member is not in order. The question before the board is as to the counsel and witnesses retained under the various gas bills.

The motion to agree with the committee was put and carried.

Dr. Stevenson's report on the gas supplied by the Imperial Company to the vestry of St. Pancras, during the month of February:—Maximum light, estimated by sperm candles, according to the Act—14·8. Minimum light, sperm candles—13·5. Average light, sperm candles—14·1. Traces of ammonia, indicated by turmeric test-paper—traces only on every testing. Traces of sulphuretted hydrogen, indicated by lead test-paper—none at any time. Sulphur, 23·75 grains per 100 cubic feet.

METROPOLIS WATER SUPPLY.

The following are the returns of the Society of Medical Officers of Health on the composition and quality of the metropolitan waters in February, 1875:—

NAMES OF WATER COMPANIES.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen.		Hardness.	
			As Nitrates, &c.	As Ammonia.	Before Boiling.	After Boiling.
Thames Water Companies.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	21·30	0·092	0·147	0·063	15·2	4·2
West Middlesex	20·93	0·059	0·162	0·001	14·8	4·2
Southwark and Vauxhall	21·07	0·119	0·167	0·003	15·0	4·2
Chelsea	20·63	0·088	0·131	0·003	15·3	4·0
Lambeth	20·67	0·118	0·144	0·003	15·2	4·0
Other Companies.						
Kent	28·13	0·008	0·245	0·000	20·6	6·0
New River	21·23	0·049	0·151	0·001	14·9	4·0
East London	23·83	0·045	0·180	0·003	15·9	4·6

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours; and in the case of the metropolitan waters the quantity of organic matter is about eight times the amount of oxygen required by it.

The water was found to be clear and nearly colourless in all cases but the following, when it was more or less turbid—namely, in those of the Grand Junction, Southwark and Vauxhall, the Chelsea, and the Lambeth Companies; and the turbidity was due to the finely-divided matters common to all rivers when in flood. The average quantity of water supplied daily to the metropolis during the preceding month was, according to the returns of the water companies to the Society of Medical Officers of Health, 109,406,261 gallons; and the number of houses supplied was 515,260. This is at the rate of 32·2 gallons per head of the population daily. The last official return from Paris stated that the average daily supply per head of the population was 30·7 gallons; but this includes the water used for the public fountains, and for the ornamental waters in the Bois de Vincennes and the Bois de Boulogne. HY. LETHEBY, M.B.

Major Bolton reports that during the month of January the state of the water in the river Thames at Hampton, Moulsey, and Sunbury, where the intakes of the West Middlesex, Grand Junction, Southwark and Vauxhall, Lambeth, and East London Companies are situated, was generally bad throughout the month. The highest flood state of the river at Hampton during the month was 8 feet 6 inches above the (6 feet) summer level, and the lowest 3 inches below. At Ditton the state of the water in the river was good on two days, indifferent on one, bad on nine, and very bad on 19 days during the month. The heavy floods mentioned in the report for December have continued throughout the whole of January. While these floods prevail the Chelsea Company are compelled to take in dirty water, and distribute such as they can get through their filter-beds,

which is generally extremely turbid flood water, in which there is a considerable amount of solid matter, too fine to settle, arising from the chalk and clay carried down by the floods. This is very difficult of removal by filtration, being only practically got rid of by long subsidence previous to filtration. The highest state of the flood water at this place was 5 feet 1 inch, and the lowest 5 inches above summer level. The highest temperature of the water during the month was 47°, and the lowest 32°, while the highest temperature of the air at the same place was 52°, and the lowest 28°. These observations were made daily at nine a.m. The rainfall during the month was 3·45 inches. The whole of the water supplied by the East London Company during January was taken from the river Lea, except 49,507 gallons, which was drawn from the Thames. The auxiliary works at Sunbury were not used during the month. The Act of 1871 provides power to compel the companies to give constant supply as and when the public authorities may see fit to move. The companies that have moved in the matter, and are giving constant supply under the provisions of the Act, in a portion of their districts, are the Kent and East London, as mentioned above. The number of miles of streets which contain mains constantly charged, and upon which hydrants could at once be fixed in each district of the metropolis, are as follows:—Kent, 80 miles; New River, 168; East London, 70; Southwark and Vauxhall, 100; West Middlesex, 67; Grand Junction, 41½; Lambeth, 90; Chelsea, 50; making a total length of 666½ miles, and the water companies are ready to affix hydrants thereon when required by the authorities. The total number of hydrants erected is at present only 2531, of which 1996 are for private purposes, 267 for street watering, and 268 for public use. Analyses of the water supplied in January, as prepared by Drs. Letheby and Frankland, are annexed. The rate of filtration of the metropolitan water supply should not exceed 2½ gallons per square foot of filter-bed per hour; this will give 540 gallons per square yard each 24 hours, and at this rate filtration should be effectual. Great difficulty has been experienced by the companies in their filtering operations during the prevalence of the recent extraordinarily heavy floods, which tended to choke the filters, by a deposit of chalk, mud, and clay upon the surface of the sand, thereby rendering the utmost vigilance and exertion on the part of the companies necessary to enable them to properly filter their supply. The bad quality of the water recently supplied by some of the companies has, doubtless, caused alarm and anxiety, which perhaps may be allayed by attention being drawn to the following extract from a special report made by the water examiner to the Board of Trade in February, 1872, and which appears to be applicable to the present circumstances:—"In order that the water may be effectually filtered, and to enable the companies to fulfil the requirements of the Act, two things above all others are essentially necessary—1. A sufficient area of properly constructed filtering-beds. 2. That the rate of filtration be controlled and limited to a certain speed. I would, therefore, recommend that it should be imperative on every water company to provide ample filtering power, by regulating its area of filtration according to its distribution—a given area of filtering surface to a given quantity of water to be fixed at a minimum—while a 'standard of filtration,' regulating the quantity of water to be passed through a given area in a given time, should be fixed at a maximum. Suspicious or doubtful water after such filtration should be submitted to chemical analysis, and judged according to a 'standard of quality.' I would also recommend that the water companies should possess a sufficient amount of storeage for either filtered or unfiltered water, the capacity of which to be regulated according to the quantity distributed, so that the necessity for the intake of turbid and muddy water during the time of extraordinary and heavy floods, tending to foul and choke the filters, may be avoided. Thus, by effectual filtration and sufficient storeage, a supply of usable and wholesome water may be ensured to the metropolis." Particular attention is drawn to the two leading general remarks by the Royal Commission (presided over by the Duke of Richmond) on the quality of the water from the Thames basin, which run as follows:—"The evidence before us leads us to the conclusion that the Thames water has many good qualities which render it peculiarly suitable for the supply of the metropolis, and which give it in some respects a superiority over the soft waters usually obtained from high gathering-grounds. When properly filtered, it is clear, bright, colourless, agreeable, and palatable, and the amount and nature of its saline constituents are considered by many to contribute to its general acceptability for drinking. It is well aërated, has good keeping qualities, and is unusually safe as regards action on lead and iron." "On the Organic Impurities: The evidence we have collected on this subject presents great diversities of opinion, but there is one result which we think is clearly deducible from the facts before us—namely, that in the present state of chemical science (1869) analysis fails to discover in properly filtered Thames water anything positively deleterious to health. Whatever may be the difference of opinion with respect to the time required for removal of all the objectionable organic matter, all the chemists agree that in Thames water taken from the present source, and properly filtered, all such matter has disappeared, and that the resulting compounds, such as nitrates, &c., remaining therein, are innocuous and harmless." Every care should be taken to prevent contamination of water from the gases generated by sewage, which are extremely liable to flow back into the cisterns and become absorbed by the water, unless the overflow-pipe is brought outside the house, and the end left exposed to the air, instead of being carried into the drain. This plan will effect an object of great importance by getting rid of the poisonous effluvia and gases from the drains which would otherwise ascend through the pipe, and not only be partly absorbed by the water in the cistern, but be partly mixed with the air in the houses, thereby becoming a cause of fever and disease.

THE AVERAGE METER SYSTEM IN THE PARISH OF PADDINGTON.

The Imperial Company have published the following memorandum in relation to the supply of the public lamps in the parish of Paddington on the average meter system:—

"The Gas and Water Committee of the Vestry of Paddington, in their report of Jan. 29 last, state that, by the adoption of the average meter system in connexion with the public lighting in that parish, they have saved, during the quarter ending Dec. 31 last, the consumption of nearly 1,500,000 cubic feet of gas, and any reader of that report, who may be unacquainted with the circumstances, would infer that this very large saving of gas has been effected by a discovery in connexion with the burners, this discovery being, as it would seem, that the burners heretofore used under the old system as the means of measuring the supply of gas to the public lamps, and which have been reckoned as passing 5 feet of gas per hour through them when lighted, have been found, under the new system, to pass no more than 4·77 per hour.

"The following extract from the committee's report contains the statements from which the above conclusions are drawn:—

"'It will be seen by the above-mentioned statement, that the 5-feet per hour burners and governors attached to the public lamps, all of which were new at the time the average system was introduced, do not pass more than 4·77 or about 4¾ feet per hour, and that the saving effected in the consumption of gas for the quarter ending the 31st of December last, has been 1,485,986 cubic feet.'

"The facts of the case, however, as verified by the figures attached to the report of the committee, are as follows, viz:—

"1. That no less a quantity than 953,312 cubic feet (of the 1,485,986 feet saved) has been gained wholly and entirely by shortening the number of hours during which the lamps have been kept alight, as compared with the hours of lighting under the old system.

"2. That the remainder (532,674 cubic feet) has certainly been gained by the parish at the expense and loss of the company, owing to the unfairness of the new system, now being tried as an experiment for one year, under which the quantity of gas consumed in the whole number of lamps is ascertained by means of the average registration of one meter attached to every twelfth lamp.

"As regards the shortening the hours during which the lamps are alight, the parish could at any time, under the old system, have made this saving by arrangement with the company, without expending one penny for meters, new burners, &c. The company have always been willing and ready to reduce the hours of lighting, the charge for the gas supplied being, of course, reduced to a corresponding extent; but the vestry have bound them down, under penalties, to light and extinguish at certain fixed times. Now, however, that the vestry have taken this duty of lighting, &c., into their own hands, they have simply commenced lighting later and extinguishing earlier than the company were bound to do under their contract, the result being that each lamp in the parish has been kept lighted during the three months 111 hours and 26 minutes less than heretofore.

"With respect to the average meter system, it is a well-known fact that the flow of gas is impeded if it has to pass through a meter; hence more gas will be consumed at the burner of a lamp, the gas to which flows directly from the main, than at the burner of a lamp, the gas to which passes through a meter after it leaves the main. The company believed that they demonstrated this fact beyond all question to the gas referees, when the vestry of Paddington appealed to them on the point. Those gentlemen, however, desired to have the experiment tried on a large scale for one year, and now that the vestry have proved the company's assertions to be correct on the scale desired, the referees will most assuredly not authorize the continuance of a system so manifestly unfair, after the expiration of the stipulated time. Until October next the company will, no doubt, have to bear this loss, which is not very important in amount, if the system is confined to Paddington, but after that period the company fully expect that justice will be done them in this respect.

"The burners, with governors attached, in connexion with the public lamps in Paddington, have been provided by and belong to the vestry; they are precisely alike at each lamp, and having been tested accurately, by instruments which admit of no mistake, by the officers both of the vestry and the company, they have been proved to pass 5 feet of gas per hour through them, no more and no less, provided there is no meter in the way to impede the progress of the gas, but directly a meter is interposed, the burner which previously consumed 5 feet per hour, is reduced to a consumption of 4·77 on the average.

"To say that a 5-feet burner will not pass so much gas as 5 feet per hour through it, in the ordinary mode of burning, is obviously an error, and indeed perfectly absurd—the instrument is constructed for the especial purpose of ensuring that result, and would do so in the absence of a meter; if it does not, it is simply not a 5-feet burner.

"By the average system, therefore, as at present adopted in Paddington parish, and of the injustice of which the company complain, whilst eleven lamps adjoining a metered lamp are known to be, and are actually consuming 60 feet of gas in every night of twelve hours (making together 660 feet), yet because the meter attached to the twelfth lamp has, for the reason before stated, registered only 57·24 feet in the same time, the eleven others are to be reckoned as having burnt 30·36 feet less than the quantity which has really been consumed by them.

"The total money value of the advantage thus gained by the vestry, in connexion with the average meter system, will probably amount to £350 during the year of trial. All other gain, arising from the shortening of the hours of lighting, is in no way affected by or dependent upon the new system, and involves no loss to the company, because, the lamps not being lighted, gas is not consumed. And this small sum of £350 (terminable in October next) is, in reality, the only advantage which the vestry can properly point to as affording them any return for the large amount they have invested in meters, burners, &c., or towards defraying the annual expense incurred for their salaried inspector and his staff who are required to conduct, watch, and control the public lighting.

"From the foregoing explanation, it will be obvious that there is no justification for the statement that the average meter system has saved the consumption of nearly a million and a half cubic feet of gas during the three months that system has been under trial, or for the assertion that a 5-feet burner will not pass more than 4·77 feet of gas per hour. It will also, no doubt, be apparent, from the particulars here given, that the large outlay which has been incurred by the vestry, in connexion with the new system, is by no means justified by the result.

33, *John Street, Bedford Row, March* 2, 1875."

HYDRAULIC LIFTS AT DE KEYSER'S ROYAL HOTEL, BLACKFRIARS.—There are two hydraulic lifts at work—one for passengers and the other for luggage. They are set in motion by water stored in a large tank at the top of the building. There is not the slightest oscillation to be experienced in travelling in them, and the engineers, Messrs. Geo. Waller and Co., Phœnix Engineering Works, Holland Street, Southwark, have been so successful in perfecting the apparatus as to preclude the possibility of any accident. If the whole of the chains and ropes which work it were to give way, then the cage would find its level on an india-rubber bed as quietly as if under personal manipulation. The roof of the cage is of boiler plate; but nothing is likely to fall upon it, as the entrances to the lift on each floor are locked from within, the attendant alone being able to unlock them from without, as he has the one key to them. At the suggestion of the proprietor of the hotel, the engineers have devised an indicator on each floor to show where the lift is. This has been patented by them. Those who want the use of the lift have simply to mark their desires on an indicator on the entrance by moving a metal hand. A corresponding movement is communicated to the lift-man, whether in the lift or out, and he at once ascends to the floor where he may be wanted. As he ascends or descends from floor to floor, so it is marked on a kind of barometer in the cage. The electrical bell system which obtains throughout the house is to be attached to the lift, for the purpose of sending messages up and down.

BOURNEMOUTH GAS SUPPLY.—At the meeting of the Improvement Commissioners on the 16th ult., a report was read from Mr. Brierley, of Southampton, who had been employed by the Lighting Committee to test the gas supplied by the committee. It was as follows:—"I have to report that I have visited the Bournemouth Gas-Works this day (Feb. 3), for the purpose of testing the gas. The examination shows the gas to possess an illuminating power equal to that of 13·15 candles and a pressure of 0·2 inches. I have also to report the testing apparatus incomplete. There is no King's gauge, and the connexions are made with vulcanized india-rubber tubing. The apparatus for ascertaining the presence of sulphuretted hydrogen and sulphur is absent. In addition to the above, the weights below 10 grains are practically useless, their values not being marked upon them. I beg most respectfully to direct your attention to the great inconvenience of having the testing apparatus at such a distance from the town; because the pressure and illuminating power will not be the same in the town as at the testing-place. I beg to say that the person in charge of the apparatus afforted me every opportunity of performing my duties." Mr. Hankinson said he saw in the Act of Parliament that the testing-house was to be "the prescribed place," but he had looked in vain to find where that place was. The clerk said the company's Act stated that the testing-house was to be at the works. The chairman said, notwithstanding this, the illuminating power must be at the place of consumption, and the commissioners could, if necessary, have a testing-house in the town. Mr. Hankinson said he had been inclined to recommend that this should be done, but he found that the cost would be about £100. It was just a question whether the commissioners would be justified in expending that amount of money in order to obtain a testing-house in the town.

RATCLIFF GAS COMPANY.

The Half-Yearly Meeting of this Company was held on the 26th ult., at the Company's Offices, Cable Street, Shadwell—J. M. FAIRCLOUGH, Esq., the chairman of the company, presiding.

After the usual formal business, the SECRETARY (Mr. H. J. Baddeley) read the following report and statement of accounts:—

The directors have much pleasure in submitting their report and accounts for the half year ended Dec. 31, 1874.

During the past six months the works have been efficiently maintained, and the plant has been increased by the purchase of some land contiguous to the company's premises in New Gravel Lane, Shadwell, which had been acquired by the Limehouse District Board of Works for a public improvement.

The various bills before Parliament affecting gas companies have engaged the serious attention of the directors, who will be prepared to act as they may be advised for the protection of your interests.

The bill introduced by the Commercial Gas Company will, however, be submitted for the consideration of the shareholders at the extraordinary general meeting; to be held at the conclusion of this meeting.

It has become the painful duty of your directors to report the death of their late esteemed and respected chairman, John Ebenezer Bromley, Esq., who had filled the office of director of this company for a period of 27 years, and at all times displayed the warmest interest in its success.

The accounts, which have been duly audited, show a net profit of £7115 13s. 8d Out of which the directors recommend that a dividend upon the paid-up capital of the company, after the rate of £5 per centum, for the half year ended Dec. 31, 1874 (less income-tax), be now declared, payable on and after the 3rd of April next.

The retiring director, John Blacket Gill, Esq., and the retiring auditor, Charles Thomas Blackman, Esq., being eligible, offer themselves for re-election.

Dr. *Trade Account, for the Six Months ended Dec.* 31, 1874. *Cr.*

Coals		£9,514	7	9	Gas	£16,722	9	6
Purifying materials		242	16	3	Public lighting	1,895	13	2
Salaries of engineer and clerk at works		385	0	0	Rental of meters	149	0	0
Wages		1,847	13	1	Coke	3,437	16	6
Repairs and maintenance of works and plant, and labour	£1,636 11 8				Breeze	37	19	6
Less old material sold	26 4 6				Tar	1,196	0	8
		1,610	7	2	Liquor	883	4	10
Salaries of inspectors and clerks in office		367	10	6	Rents	93	0	0
Repairs and maintenance, distribution, and labour		648	14	2	Miscellaneous receipts	154	18	0
Repairing and renewing meters		245	4	6				
Lighting and repairing public lamps		326	9	2				
Rents		193	5	3				
Rates and taxes		425	19	9				
Directors allowances		400	0	0				
Salaries of secretary, accountant, &c.		390	15	0				
Collector's commission		143	5	0				
Stationery and printing		37	19	8				
General establishment charges		120	19	8				
Auditors		15	15	0				
Depreciation-fund (leaseholds)		110	0	0				
Bad debts		36	11	7				
Interests on borrowed capital		391	15	0				
Net profit		7,115	13	8				
		£24,570	2	2		£24,570	2	2

The CHAIRMAN: Gentlemen, it is now my pleasure to move the adoption of the report, and I am sure it will afford you as much satisfaction as it does your directors that we are enabled to place such accounts before you. I think, as presented, they will prove to you that our working is second to none of the companies in London. When we recollect that during a period of difficulty, and of exceptionally high prices, we had been able not only to pay but to earn our dividend, and to show, too, a fair advance during the last year's working, you will say again that it is a matter of congratulation. For that result we, no doubt, are indebted to the energy, perseverance, and ability of those who have presided over our works. The next part of the report refers to the purchase of land, a notice of which was placed before you on a former occasion. That purchase has been completed during the past half year. A substantial wall has been erected around it, and a roof placed over it, the erection already being turned to useful account. Whether we remain as we are, or whether we become allied with another company, that addition to our plant must prove of the greatest value to us. As to the bills before Parliament, the Purchase Bill and the New Works Bill have been withdrawn. We, in concert with the directors of other companies, have taken our part in opposing them; but now there is an end to that matter. The third bill has not yet been printed, and is not formally before us. No doubt it will be much more stringent than the bills already in existence, but I think that, under the wisdom of Parliament, and with the aid of the committee, it will, if it should become an Act, be of such a character that all the companies may be enabled to work under it. The Commercial Gas Company's bill will come before you at the meeting to follow this. That bill has passed a second reading. I do not know that there is any other matter in connexion with the report that needs comment, excepting one of a painful character—namely, the loss of our late chairman, who was so well known to all of us, and who had been for 27 years associated with the company, during which period he took a great interest in its management. I am sure we, who knew him, must feel that in losing him we have lost a kind and genial associate. I now move—"That the report and accounts read be received, adopted, and entered upon the minutes."

Mr. HAMMACK seconded the motion.

Mr. WILKINSON inquired the amount of the general reserve-fund.

The SECRETARY stated that the amount invested in Consols was £5047 10s. 10d.

The motion was then agreed to.

The CHAIRMAN: I now have the pleasure to move—"That the dividend for the half year ending the 31st of December, 1874, upon the paid-up capital of the company, at the rate of 5 per cent., less income-tax, be now declared, and that it become payable on and after the 3rd of April next."

Mr. GILL seconded the resolution, which was agreed to.

The CHAIRMAN moved the re-election of Mr. J. B. GILL as a director of the company.

Mr. HAMMACK seconded the resolution.

Mr. FRASER, in supporting the resolution, said Mr. Gill's father, with whom they were well acquainted, for many years took a most active part in the business of the company. He hoped that Mr. Gill might be spared for many years to assist in guiding their undertaking.

The resolution was agreed to.

Mr. GILL, in responding, said he was extremely obliged to the shareholders for their kindness in re-electing him to his position at the board. Mr. Fraser had most feelingly alluded to his late father, and he (Mr. Gill) felt sure that if he followed in his father's steps, he would continue to merit that which he most earnestly desired to do—their kind approbation. The past two years had been a time of considerable anxiety to all connected with gas matters. He had devoted his best energies towards promoting the interests of the company, and he hoped that in the future he should succeed in meriting their esteem, as he was glad to think he had done in the past.

Mr. NUTTER proposed the re-election of Mr. C. T. Blackman as auditor of the company, which was seconded by Mr. JONES, and agreed to.

The meeting was then made special, in order to consider the bill introduced by the Commercial Gas Company for an amalgamation with this company.

The CHAIRMAN: I purpose, in the first instance, to say a few words on the subject of this special meeting, and then to call upon the secretary to read the headings of the bill, so that you may be in possession of all facts. In the first place, I think it is a very fair inference that many around me would ask, "Where is the necessity for amalgamation?" Why, after so favourable a balance-sheet, should we think of altering our position, and why should we desire to destroy those old associations and that independent action that we have enjoyed for so many years? This is a very fair question, and we feel that our shareholders would like it answered. It is with that view we have called you together on this occasion. The formal vote will take place at the Wharncliffe meeting, which must be called after the bill has passed one of the Houses of Parliament. We desire, in the interval, to make you acquainted with what has taken place, in order that you may form your judgment, and if you see fit strengthen the course we have taken by passing a resolution in favour of it. We, as your directors, are quite satisfied with our position. We would much rather remain here to represent you as directors of the Ratcliff Gas Company. We have given you satisfaction, we have given our district satisfaction, and there is every reason why we should desire to remain as we are. But there is no contending against the force of circumstances, and these circumstances induce us to think our wiser course would be to accept the proposals of the Commercial Gas Company. I will now tell you, as far as I am able, the position of the Commercial Gas Company. They are a younger company than ourselves, but they have been a most successful company. They have a capital of £450,000, and supply a large and increasing district. They, like ourselves, are working second to none of the London companies. They have to supply an increasing demand, and consequently must look for an increase of capital. To obtain that capital they must go to Parliament, and although they and you might think the present is an inopportune time, yet, in their case, it was a necessity. In order to supply their district, they must have increased powers and capital, and believing that in applying for those powers alliance with this company would strengthen themselves before a parliamentary committee, and would be in accordance with the views expressed by the Board of Trade, and feeling that we were in a similar position, a well-working company, equal in every respect to themselves, they thought it desirable that this company should allow its name to appear in the bill they were about to present to Parliament. Their chairman waited upon your directors, stated these facts, and proposed to take us in on equal terms. Your directors took the matter into consideration. They felt the thorough stability and standing of the Commercial association. They saw the necessity for the course taken, and then they took into consideration your interests, and the course they, as directors of the Ratcliff, should take with a view to support your interests. There was the chance of a favourable alliance. Looking to the future, we were aware that in a short time we should be in the same position that the Commercial are now in. We are gradually working away our capital, and when I tell you, in making up the accounts for 1874, as against 1873, during the last half year there was an increased return for gas, amounting to £1000 in our own district, you will at once see the time must be very short before we should be obliged to do as the Commercial are about doing—go to Parliament for an increase of capital; we have so nearly approached the end of our tether. We know that we are a small company, and in going to Parliament alone, we might discover our weakness. We know that if we were to reject this offer of alliance with the Commercial, they, in the event of obtaining those powers, might not then see the necessity for amalgamation with ourselves, and we might possibly be forced into alliance with companies perhaps not so intrinsically valuable as the Commercial. All those things we had to look to. We felt that in the present case of the Commercial obtaining their powers, it was without any expense to this company; the Commercial are paying every penny of expense. Should we, in the course of a few years, have to go to Parliament, we shall have to bear the brunt of that expenditure—a matter of some consideration with a small capital like ours. I have endeavoured to point out the advantages of this course, though no doubt there are many things I have omitted. I believe in the interests of the shareholders of this company it is the best thing we can do. We know the Commercial Company to be desirable allies, and an alliance with them would strengthen our dividend-paying powers, inasmuch as it would be extended over a larger area of working, for the district of the Commercial is five times that of the Ratcliff. Another thing is, they stand in one sense in a better position than we do. Their business capacity is greater with regard to dividend-bearing capital. We doubtless have something to offer them. We have our river-side premises as a set off against their peculiar advantages. Then they have no preference capital. Some companies are overburdened with preference capital. The Commercial have none; and we should share on equal terms with them, and, of course, share in every issue of new capital. There is no doubt that we should also secure by the amalgamation great facilities of working. I do not know that I can add anything to what I have said upon the subject.

Mr. T. BADDELEY asked for some further explanation with regard to the statement that the Ratcliff Gas Company was gradually getting beyond its capital.

The SECRETARY said the company had, according to the balance-sheet just presented, £4330 uncalled capital in the shape of shares or bonds. The total capital they were authorized to raise was £120,000, of which they had raised £115,670.

Mr. WOOD asked for what purpose this extra capital would be needed. Was it for some purposes to which they were not at liberty to apply profits? It was clear that there were certain developments of the work to which they might apply their profits, though there were others to which they could not be applied. What amount of new capital would they require, and what were the works for which it would be required?

The CHAIRMAN said it was impossible to state at the present moment what new capital might be eventually needed. They had not yet arrived at that condition, but the chances were they must come to it shortly. With reference to expenditure out of profits, that could only be done to a limited extent. During the past year they had expended on additional land the sum of £2000, which made a large hole in their remaining capital.

Mr. WOOD: To what extent are we authorized to create additional works out of profits?

The CHAIRMAN: On capital account, strictly speaking, not any.

Mr. WOOD said that, considering the question of amalgamation, it was most important to know whether they were not in a really better position than the Commercial. Hitherto, their position had been most thoroughly satisfactory, and looking at the small district they had to supply, and the prospect that their expenditure must be confined within that small district, was it or was it not the fact that they were more favourably circumstanced than the other company? Before the meeting could form any opinion on the subject, it must have all the facts fully before it. No doubt it was an important consideration that the Commercial were quite free from debt and preference capital; at the same time, the shareholders in the Ratcliff Company, at meeting after meeting, had been led to think that they possessed, besides their share capital, very great advantages with reference to their water-side premises and the leaseholds that they had acquired. It was very well to say that by the Commercial going to Parliament and applying for an increase of capital, they would get, without charge to the Ratcliff, power which, if they (the Ratcliff) went, would cost them a large sum.

The moment they amalgamated with the Commercial, their debts became the debts of the Ratcliff Company, and the latter company would have to adopt all the expenses in going to Parliament. He was anxious that the shareholders should be fully informed as to the relative position of the two companies, and whether there was any doubt about their legal position.

Mr. T. BADDELEY said the chairman put specifically before the meeting, as the reason why they should adopt the suggested amalgamation, that they were trenching upon their capital, and that there was almost a certainty that they would require to raise fresh capital. If that was a fact, surely some statement could be made as to the reasons why they would shortly have to raise fresh capital.

The CHAIRMAN said he had not stated that there was any immediate occasion for raising further capital, but that in the ordinary course of things that period must arrive. Their supply of gas was increasing at the ratio of from 6 to 7 per cent. per annum, which must, in the long run, entail an extension of works It was not an immediate necessity, and they might be able to go on for some time to come.

Mr. JONES said he appeared there feeling a double interest, for he came before them as a shareholder in the Ratcliff Company, and also as the engineer of the Commercial Company. Questions had been asked as to the *status* of the two companies, and also as to how far the Ratcliff Company would be enabled to go on by itself. As to the *status* of the Ratcliff Company, it was shown by the fact that they had not above £5000 worth of capital to spare. And as they were progressing at a rate of increase of 6 or 7 per cent. per annum, it showed him very clearly, as an expert in gas matters, that they would not be able to go on for more than three or four years, especially when they bought land at the rate of £2000, as was done last year. Their existence was not more than three or four years at the outside, therefore it was necessary to look in advance, more especially when they knew it was the desire of the Board of Trade that the gas companies should amalgamate as far as possible. The Commercial might, instead of going to Parliament, have amalgamated with one of the large companies, but they were desirous of maintaining their identity and independence. They to declined to adopt that course out of regard for the consumers more than o their shareholders; for if they had amalgamated under the revised clauser f the 1868 and 1869 Acts, they would still have been entitled to receive 10 pe cent. But they felt they had other interests to take into consideration, namely, the interest of the consumers, and that the amalgamation with that large company thereby securing their proprietors interest, would not have been fair to the consumers of the district; for, for the last two years, the consumers of the districts of those large companies have been paying 4s. 8d. or 5s. per 1000, whilst the consumers of the Commercial district had only been paying 3s. 9d. and 4s. That was the reason why they were in Parliament. They were short of necessary capital, and were desirous to maintain their independent existence. They invited the Ratcliff to join them, because the Ratcliff district was enveloped by the Commercial. The working of the Commercial, and their capital as compared to their rental, were second to none. They might have maintained, as the Ratcliff maintained, with the utmost credit to the company, the lowest possible price, without increasing the price to the consumers one farthing, during the time of exceptionally high prices. The Commercial Company, it was true, went up 3d., but they might have maintained their position at 3s. 9d. if they had followed the example of other companies, and charged a rental for their meters. The shareholders of the Ratcliff Company were not being invited to join a company that was not intrinsically as valuable as their own. In looking ahead, the directors saw that they would be securing and consolidating their interests. The Commercial Gas Bill had passed the second reading, and no doubt in committee they would be opposed. The strongest opposition was that of a neighbouring gas company, which had called forth the hostility, not only of the consumers of London, but of the Government and of almost every member of the Houses of Parliament. The agitation of London with reference to the gas companies was very great, but no dissatisfaction was expressed in the districts either of the Commercial or the Ratcliff. Every one of the boards in the district were in their favour, and had passed resolutions to support the bill, so long as they were prepared to accept what Parliament, in its wisdom deemed fair to the companies and the consumers.

Mr. WOOD was extremely obliged to Mr. Jones for his statement, but at the same time they must recollect that Mr. Jones had very honestly stated he was holding office in the Commercial, and his position would naturally lead him to look favourably upon the views of that company. They wished to hear what their legal adviser had to say upon their legal position, and what the directors had to say with reference to all the details of the amalgamation. He was not hostile to the proposal, but desired information, and to be placed in a position to judge for himself. He knew nothing with regard to the Commercial beyond what they had just heard, and must confess himself a little bit startled at the difficulties towards which it was said the Ratcliff Company was approaching. They must remember that in going to Parliament they put themselves in a dangerous position, in which they were liable to have terms imposed upon them. There was, doubtless, more hostility against the large companies, but that was rather a reason for pausing before being committed to an amalgamation, leading on towards the position of a large company. He had hoped that, with their command of the water-side, and their freehold property they had got a something that would entitle them, in the event of an amalgamation, to something rather better than equal terms.

Mr. HAMMACK said the observations made by the chairman were made with the entire concurrence of the directors, who had given their constant and most earnest attention to the matter. Some three years ago they had an offer of amalgamating with another company, but they did not entertain it, feeling that it would not be for the interest of the shareholders. They were now in possession of an increasing business, and knowing that they would shortly have to go for an increase of capital, they felt, seeing that the Commercial were going for the same purpose, that this was just the opportunity to join with them, to share the common expense and the common result. They could not do better than 10 per cent. They were certain that the Commercial would always pay 10 per cent., and could do no better; therefore, by joining them on equal terms, and getting a share of that new capital, the directors believed they were giving the proprietors an advantage which alone they could not offer. By and by, if the Ratcliff Company went alone to Parliament, some burden might be imposed upon them, such as a 7 per cent. dividend for new capital; if they went with the Commercial, their immense undertaking would enable them to put such a case before Parliament as would secure them the 10 per cent. upon new capital. If they went alone, Parliament might say, "With the Chartered main running through your district, tap that main, do not get increased capital;" and if that was declined, they might say, "We will give you 7 per cent." By joining the Commercial there was every possible certainty that they could get a continuance of their 10 per cent., not only upon that which they now had, but upon that which would be created, and in which they would participate. The directors were convinced that the course they were recommending was the right one. The Commercial Company were making upwards of 11 per cent. upon their capital, while until this half year they (the Ratcliff) had not made 10. He believed that by their united capital and energies they would be a very splendid company.

Mr. WOOD said if they succeeded in getting liberty to raise their new capital at 10 per cent, no doubt it would be a very splendid thing, but that was not what had been allowed with regard to the Imperial.

Mr. JONES said the Imperial accepted 7 per cent. because they were allowed to give only 14 candles. The Commercial Company, in their bill, accepted 16. Parliament gave the Chartered 10 per cent. for 16-candle gas, and they hoped to get the same.

Mr. T. BADDELEY said, after the observations that had been made, his opinion had been materially altered in favour of the amalgamation, and he was prepared to give it his support.

The heads of the Commercial Gas Bill were then read by the SECRETARY, and its principal clauses explained.

The CHAIRMAN then proposed the following resolution—"That the bill now submitted to the meeting be, and the same is, hereby approved, and the directors are authorized to take such measures as they think necessary to secure the passing of such bill, subject to such amendments being made therein as Parliament may think fit, or as to the directors may seem desirable."

Mr. HAMMACK seconded the resolution, which was unanimously agreed to.

Mr. T. BADDELEY inquired if their company would be represented before the parliamentary committee, and the SECRETARY said that they would be.

The CHAIRMAN said they had one duty to perform—namely, to acknowledge the services of their officers, without whose help and assistance they could not possibly have placed accounts such as these before the shareholders.

Mr. GILL seconded the resolution, which was agreed to.

The SECRETARY and the ENGINEER having briefly acknowledged the votes,

On the motion of Mr. WILKINSON, a vote of thanks was given to the directors and chairman, and the proceedings terminated.

DOVER GAS COMPANY.

The Half-Yearly Meeting of Shareholders was held on the 2nd inst.—Mr. W. R. MOWLL in the chair.

The following report of the directors was read:—

We have to report a considerable increase in the consumption of gas during the past half year, the profits arising from which will enable us to propose to you a dividend at the rate of 7½ per cent. per annum; but, as a considerable reduction in price to private consumers takes effect from the commencement of the current half year, we should be wrong in leading you to conclude that our dividends are as yet permanently assured at that rate, which, however, looking at the risk and speculative nature of the circumstances attending gas manufacture, we think a very reasonable dividend for you to receive. The balance standing to profit and loss is £1784 10s. 6d. The dividend will take £1725, leaving £59 10s. 6d. to be carried forward. Should the price of coal continue to recede, we shall, at no distant date, have the pleasure of giving a further reduction in the price of gas to the consumers. It is satisfactory to learn from Mr. Kirkham's report, that he considers the works fully equal to the probable requirements of next winter, but we regret to observe that the managers do not agree with him in that respect. We shall continue to use our best endeavours to protect your interests while dealing fairly and honourably with those gentlemen who primarily bear the responsibility of the conduct of the works.

Mr. T. N. Kirkham reported as follows:—

I yesterday (Feb. 15) visited your works, and found the whole of the plant in good working order. No outlay is required, excepting that for wear and tear, the cost for which devolves upon your managers. With respect to the extra gasholder capacity, and purifying power, asked for by your managers, I beg to report that, after very careful examination of the subject in question, I find that with the number of retorts they have at command, the gasholder capacity is sufficient for next winter's supply, and that the purifying power is ample to carry them through the winters of 1875 and 1876.

Messrs. Anderson and Jones, (the managers) report was as follows:—

Owing to the increasing consumption of gas, and to meet the requirements of the medical officer of health, we have to apply for the following extensions for next winter's supply—1, additional gasholder storeage; 2, two additional purifiers; 3, completion of the 14th main; 4, exhauster to drive the gas into Russell Street station. As we have on several previous occasions personally, and in writing, called attention to the above, we have to ask the favour of your earliest decision.

The CHAIRMAN, in moving the adoption of the report, said it embodied just what he wished to say to the meeting. As to the present price of gas, he was glad to say that consumers were now paying only 4s. 3d. per 1000 cubic feet, a reduction of 6d. per 1000 over the price paid in the previous half year. It was much less than that paid in adjoining places, but they cherished the expectation of making a further reduction if the coal markets ruled as was expected. Of course they could not shut their eyes to what was said occasionally about the company in another place. As chairman of the company he would venture to observe that if persons who were attacking them from time to time, not being themselves shareholders, would but fairly consider the position of the company, and deal with them as they would wish a company of which they were shareholders to be dealt with, he was confident that a great many of the remarks occasionally heard would never be made. The company were at the present moment supplying gas as cheaply, speaking roundly, as it was supplied in similar towns, and yet he was able to say that the directors hoped very shortly to be able to charge a still lower price. It was true that under the new contract the local board would have to pay more than before for the lighting of the public lamps, but they should remember that the assessment of the company's property in the town had been more than doubled. It naturally followed that if the company's property were taxed in a heavy degree for the purpose of contributing to the public expenditure of the town, an additional charge must be made for the gas. Further, up to the present time the public lights—or rather the public at large who were not consumers, but who enjoyed the advantage of the public lamps—did not pay their fair quota, and it occurred to the company that it was only fair that the whole of the community should be fairly taxed for their use of the public lamps. So the charge for public lamps was increased; but whatever was gained by that was employed to lessen the charge to the private consumer. Of course as an *ad captandum* argument it was possible to say, "We are paying the gas company more than before for the public lamps," but the answer was, "Previously to the present contract you did not pay enough, and whatever you may have to pay more now comes back to all of you who happen to be private consumers as well as ratepayers." As regarded the last clause of the report, he was happy to tell them that the matter had been amicably arranged. That morning the directors had an interview with Messrs. Anderson and Jones, at which Mr. Kirkham, the consulting engineer, was present. The managers had modified their application, the directors on their side had approached them, and the result was a perfectly amicable settlement. The extension of the works agreed upon would involve an outlay of something like £700, but the extension would place the managers in a position to carry on the work with the least possible inconvenience, so far as smell was concerned, to the public. He concluded by moving that the report be adopted, and a dividend declared at the rate of 7½ per cent.

Mr. JONES said he believed it was customary for the deputy-chairman to second the adoption of the report, but, with their permission, he himself would do so. The chairman had referred to the taxes paid by the company. They amounted to something like £1000 a year. He happened to be a shareholder in the Canterbury Gas Company, and he received his dividends, which were at the rate of 7 per cent., that morning. He found on comparing the rating of their company with that at Canterbury, that theirs was in excess to the amount of 1¼ per cent. on their capital. If their ratings were the same as those at Canterbury, instead of a dividend of 7½ per cent., there would be one of 8¾. He thought the public ought to know how heavily they were taxed, for it very materially affected them. With reference to the arrangement effected that day, he might say that he was greatly opposed to increasing their capital, but the outlay of £700 would be a permanent investment, and would enable them to supply any reasonable additional amount of gas that might be required. They hoped also that it would enable them to carry on the works without further complaints from Dr. Robinson, and with

that object new alterations would be made in their purifying plant. If things went on smoothly, he believed they would be enabled to maintain their dividends, and give a further reduction to consumers.

The motion was put, and carried unanimously.

Mr. JONES said that at their last meeting, when the chairman was absent through illness, he had the pleasure of proposing a vote of thanks to him, which was cordially adopted. He had now the pleasure and privilege again to ask the shareholders to accord their thanks to the directors, especially to the chairman. Of course, there had been differences of opinion, but they had been waived, and the utmost good feeling prevailed.

Mr. ANDERSON said before this was put he would like to say a word. He did not like people to assume the gift of prophecy. Considering the high taxation of the company, and the extraordinary increase during the last two years in the price of coal and iron, he thought it was wrong for the directors to count upon a further reduction in the price of gas, especially as they had just lowered it by 6d. If it were possible, of course they would do it, but looking at the fact that the price of coals had doubled, and the possibility of a strike, they could not predict a reduction so readily.

The motion was put and carried.

The CHAIRMAN, in reply, said that whatever he might have been formerly, he was now a man of few words. In the name of his colleagues, he begged to thank the shareholders for their vote of thanks. He believed he could say of all, that their only desire was to do their duty, and if that duty could be carried out in an amicable manner he was always glad.

The proceedings then terminated, after a hearty vote of thanks had been awarded to the secretary (Mr. Fielding).

RICHMOND (SURREY) GAS COMPANY.

The Ordinary Half-Yearly General Meeting of this Company was held at the Greyhound Hotel, Richmond, on the 25th ult.—Mr. F. CHAPMAN in the chair.

The report, which was taken as read, was as follows:—

The directors beg to present to the shareholders the accounts containing a statement of the affairs of the company for the year 1874, and, in doing so, have to congratulate them on the recovery in a great measure from the late depression. They now recommend that a dividend be declared for the half year ending the 31st of December last, of £6 per cent. on the original capital, and £4 4s. per cent. on the new capital, making for the year £9 per cent. on the original capital, and £6 6s. per cent. on the new. Your directors have to regret the irreparable loss of the late Mr. William Chapman, who for a period of 28 years so ably and courteously gave them his assistance in the capacity of chairman to the board. Two of your directors retire by rotation—viz., Messrs. Frederick Chapman and H. J. S. Hopwood; both are eligible, but the former only offers himself for re-election. There will thus be three vacancies in the directorate to be filled up by you. Your auditor, Mr. Pugh, retires by rotation, and offers himself for re-election.

The revenue account was as follows:—

Revenue Account.

Manufacture of gas—				Sale of gas—			
Coals, including cartage, &c.	£10,096	14	0	55,378,400 cubic feet at 4s. 3d. per 1000	£11,779	19	4
Purifying materials & sundries	270	8	11	5,148,200 cubic feet at 4s. 9d. per 1000	1,224	13	6
Salary of engineer	300	0	0	Public lighting and under contract	1,692	4	4
Wages and gratuities at works	1,439	19	5	Rental of meters	686	3	9
Repair and maintenance of works and plant	855	0	1	Residual products—			
	£12,962	2	5	Coke, less labour and cartage	3,103	9	7
Less old material sold	60	15	3	Breeze do. do.	223	16	4
	£12,901	7	2	Tar do. do.	582	9	10
Distribution—				Sulphate of ammonia, less labour and cartage, and acid	514	6	1
Salaries	148	11	10	Services	102	6	3
Repair and maintenance of mains and service-pipes, and labour	185	2	6	Rent of cottages	6	12	0
Repairing & renewing meters	139	8	11				
Public lamps—							
Lighting and repairing	291	5	7				
Rent, rates, and taxes—							
Rent	13	12	6				
Rates and taxes	404	5	9				
Management—							
Directors allowance	300	0	0				
Salaries	235	5	11				
Collector's commission	295	6	11				
Stationery and printing	73	7	9				
General charges and incidentals	83	19	6				
Auditors	40	0	0				
Law charges	59	10	4				
Bad and doubtful debts	141	10	2				
Allowances	9	8	7				
Balance	4,587	17	7				
	£19,916	1	0		£19,916	1	0

The CHAIRMAN, in moving the adoption of the report, congratulated the shareholders on the amount of the dividend, and complimented Mr. Eldridge, the engineer, on the manner in which he had contributed to the present satisfactory position of affairs by his good management.

The report having been adopted, Mr. F. Chapman was re-elected; and Mr. T. M. Clarke and Mr. Macrae having been severally nominated as directors to fill the vacancies, they were elected *nem. con.*

Mr. Pugh was re-elected auditor, and a vote of thanks to the chairman closed the proceedings.

SOUTH SHIELDS GAS COMPANY.

The Annual General Meeting of this Company was held on Friday, Feb. 26—Mr. R. WALLIS in the chair.

The following report was read by the SECRETARY (Mr. Lawson):—

The directors have much pleasure in presenting to the shareholders the annual report of the company, along with the balance-sheet and accounts for the past half year, ending the 31st of December, which show the continued prosperity of the company.

They have now used up the contracts for coals at high prices. The number of consumers is rapidly increasing; your directors, therefore, under these circumstances, recommend the usual dividends of 4½ per cent. on the old, and 3½ on the new capital of the company, which will be made payable on the 8th of March. They also hope to be shortly in a position to reduce the price of gas to the consumers.

The new works at Jarrow are steadily progressing. The severe winter has been a hinderance to the more rapid construction. Looking to the future, your directors have come to the conclusion of making the Jarrow works more extensive than was at first intended. They have secured ground for the erection of works of more power in the manufacture of gas than the present Shields works, which extension they are confident will be shortly required to meet the demands of the large increase of manufactures and the extensive districts the company have to supply.

The illuminating power has averaged the standard prescribed by the Act of Parliament.

Your directors retire from office at this meeting; they are eligible for re-election, and offer themselves accordingly.

Mr. Chapman is the retiring auditor, and offers himself for re-election.

The profit and loss account for the half year showed that the receipts, including a balance of £1637 6s. 6d., had been £16,915 1s. 7d.; and the expenditure £19,297 17s. 4d., leaving a balance to profit of £3617 4s. 3d.

The CHAIRMAN, in moving that the report and accounts be adopted, remarked that the past two years, owing to the high price of coals and everything connected with gas-making, had been very eventful years for gas companies. It was therefore very satisfactory to find that the South Shields Gas Company had come out of it so well as they had done. They were now at an end with their high-priced contracts for coal. Iron was coming down, and there was every prospect of them going on satisfactorily, the contracts which had now been made satisfying the directors that everything would be for the better this year. The weather had been very unfavourable for the new works at Jarrow, but still they were progressing in a tolerably satisfactory manner. These works it was not contemplated to complete at once; they would erect only such portions as would tide them over from time to time. The contracts for the gasholders had been let to a most respectable firm, who had always served the company well. During the past year they had sold 6 million feet more gas than in the previous year. He then referred in complimentary terms to the services rendered by their highly efficient engineer of the company, Mr. Warner.

Mr. RIDLEY seconded the adoption of the report, and it was agreed to.

Mr. J. L. HALL moved that a dividend of 4½ per cent. on the old, and 3½ per cent. on the new capital of the company, for the half year ending Dec. 31, be declared.

The resolution was seconded by Alderman DALE, and carried unanimously.

Mr. J. C. HEATH moved a vote of thanks to the chairman and directors for their valuable services.

The resolution was seconded by Mr. DUNCAN, and carried.

Mr. HENRY NELSON returned thanks.

Mr. J. M. MOORE proposed, and Mr. DOUGLASS seconded, a vote of thanks to the chairman for presiding.

The CHAIRMAN briefly replied.

The ballot papers having been examined, the retiring directors and retiring auditor (Mr. Chapman) were declared re-elected.

The meeting then terminated.

READING GAS COMPANY.

The Half-Yearly Meeting of this Company was held on Monday, Feb. 22,—Mr. J. O. TAYLOR in the chair—when the following report of the directors to the shareholders was submitted and approved:—

The directors have the pleasure to present to the shareholders the statements of account and balance-sheet for the half year ended Dec. 31, 1874; and to recommend that full dividends be paid on the 1st of March next on all the stocks and shares of the company, as set out in dividend account.

Your directors, in order to keep pace with the growing business of the company, will have to take measures for increasing the capacity of the large gasholder at King's Road station, and for extending the plant in other respects; this will involve an expenditure of about £2000 on capital account, the estimates and resolutions in relation to which will be presented at the meeting of shareholders.

Your directors are glad to be able to report that the ordinary business of the company has been conducted to their entire satisfaction by Mr. Baker, the company's engineer, and that the inspector of public lighting, in his annual report to the Reading Sanitary Authority, called attention to the high standard of illuminating power of the gas supplied by the company during the past year.

The directors retiring by rotation are Messrs. Davies, Minty, and Trendell, and the retiring auditor, Mr. W. B. Williams. These gentlemen are eligible, and offer themselves for re-election.

Dr. *Profit and Loss Account, Dec. 31, 1874.* *Cr.*

Coals consumed	£6,118	12	2	Gas-rental	£10,719	6	0
Purifying materials	78	11	2	Coke	1,982	3	7
Meters	120	18	7	Tar and ammoniacal liquor	1,104	18	2
Fittings	92	5	3	Rents of tenements	12	4	9
Materials	591	7	6				
Contingency-fund	355	0	0				
Wages	1,927	15	5				
Salaries, &c.	755	16	7				
Tradesmen's bills	302	19	11				
Rates, taxes, &c.	490	5	1				
Interest	237	17	5				
Barge account	48	17	0				
Bad debts and allowances	53	8	0				
Miscellaneous	87	11	10				
Balance	2,559	6	7				
	£13,818	12	6		£13,818	12	6

Balance-Sheet.

Share capital paid up	£60,000	0	0	Cost of plant, &c.	£74,391	13	9
Mortgage debt	11,000	0	0	Amount due for light	7,714	16	11
Premiums on shares	3,524	0	0	Coke	1,042	17	2
Debts due to sundries, viz.:				Tar and ammoniacal liquor	469	11	9
Coal	1,785	5	0	Fittings	74	18	10
Coke	11	0	10	Stock on hand—			
Purifying materials	23	1	2	Tar and ammoniacal liquor	368	10	4
Meters	14	7	1	Purifying materials	58	0	0
Fittings	42	14	8	Coals	1,269	12	1
Wages	3	0	0	Coke	232	0	0
Materials	147	18	4	Meters	99	14	6
Tradesmen's bills	89	3	5	Fittings	107	0	0
Rates, taxes, &c.	495	19	10	Materials	750	10	0
Barge account	26	12	0	Office furniture	40	0	0
Salaries, &c.	155	17	9	Barge	30	12	0
Miscellaneous	26	8	5	Petty cash in hand	65	0	0
Unclaimed dividends	81	5	5	Balance, contingency-fund	4	4	8
Reserve-fund, £3000, and dividends accrued thereon, invested in £3590 18s. 9d., New Three per Cent. Stock				Ditto in banker's hands	155	13	4
Ditto, dividends received to be invested	53	8	4	Ditto, dividend account	37	9	5
Balance brought from last account—dividend account	6,872	6	11				
Profit and loss account	2,559	6	7				
	£86,911	15	9		£86,911	15	9

CANTERBURY GAS AND WATER COMPANY.

The Half-Yearly Meeting of Shareholders was held on the 26th ult.—Mr. FURLEY in the chair.

The following report was submitted:—

The accounts and balance-sheet for the half year ending the 31st of December last are submitted for the consideration of the shareholders.

The works which have been lately completed comprise the new condensing apparatus, two new scrubbers, and a large station-meter; with these additions to the gas plant, your directors trust that no very large outlay in extension of works will be required for some time. The new engine and pumps at the water-works are still unfinished, but they are expected to be completed by the end of the present month.

The balance standing to the credit of profit and loss account, including the interest on money deposited with the bankers, amounts to £3416 6s. 6d.; a portion of this sum will be required for payment of such proportion of the alterations in the gas plant as will fall on the revenue; a further sum of £100 will have to be set apart towards the new gasholder; and, after providing for the half year's interest on the mortgages, your directors recommend that the balance be appropriated in paying a dividend at the rate of 7 per cent. per annum on the capital stock and the A and B shares fully paid up, and that interest at the same rate be paid on the capital called up during the last half year, from the respective times of payment, such payment to be free from income-tax.

Your directors feel that, although the company are entitled under their Act of Parliament to charge 4s. 6d. per 1000 feet of gas, as the price paid for their coals has exceeded 20s. per ton, the time has arrived when a reduction may be made in such charge, and they are prepared to lower the price of gas from 4s. 6d. to 4s. 2d. per 1000 feet, from the 31st of December last.

Much inconvenience having been felt in the registry and transfer of the present A and B shares, it is proposed that, after the business at the ordinary meeting is concluded, a special meeting take place for the purpose of converting such shares into A and B stock, in amounts equivalent to the proprietors holding of shares. By this arrangement, the capital of the company will then consist of the original stock, and the A and B stocks; and shareholders will have a certificate of such stock in lieu of their shares, which cer-

tificate may be dealt with to the extent of all or any portion of the stock comprised therein.

The retiring directors are Messrs. Marten, Amos, Hart, and Linom, and they, being duly qualified, offer themseves for re-election.

The CHAIRMAN, in moving the adoption of the report, congratulated the shareholders upon the satisfactory balance-sheeet the directors were enabled to present to them, and stated that it arose from two causes. In the first place during the prior six months coals had to be purchased at a high rate, and coke did not realize so high a price as it should. During the past six months, however, the company had been enabled to buy coals on better terms, coke had realized a higher rate, and this, coupled with the increased consumption, had produced a more satisfactory state of things. In dealing with the question of increased consumption, he was aware he was treading on delicate ground, but he believed he should be enabled to show that the management had been conducted in a manner calculated to extend justice to shareholders and consumers. In order to arrive at results bearing upon the consumption of gas in 1873 and 1874, their secretary (Mr. Burch) had taken, in consecutive order, the names of 500 consumers, and an analysis showed that 25 per cent. had been charged less in 1874 than in 1873, 25 per cent. were the same in one year as in the other, and 50 per cent. exhibited an increase on the last-named year. This, he thought, was convincing proof that there was not a regular increased consumption, as had been represented. So far as the manufacture of gas was concerned, it could be shown that 3,119,000 feet more had been made in the half year ending 1874 than in the corresponding half year of 1873. They had carbonized in the same period 371 tons more coal, which would produce 4 million cubic feet of gas, and allowing for a waste of 10 per cent., the increased consumption was indisputably accounted for. Referring to the reduction of 4s. 6d. to 4s. 2d. per 1000 feet proposed to be made in the charge for gas from the commencement of the year. He observed that it appeared to be a large sum to take off the profits; but the directors felt that they were in a position to carry it out, and hoped that when the next half-yearly statement was produced the shareholders would not consider that they had made too great a concession detrimental to their interests. He would only add that the directors had felt it their duty to make the deduction, preferring rather to promptly deal with the matter than await pressure from outside. Before putting the proposition, he invited remarks from any shareholder present.

Mr. J. KNOWLER inquired how it happened that his bills had steadily increased since 1871. His consumption was regular and steady.

The CHAIRMAN said there was probably a leakage of which Mr. Knowler was unacquainted.

The MANAGER remarked that the service-pipe had been enlarged in the neighbourhood of Mr. Knowler's residence, and there was a consequent increased pressure.

The adoption of the report was seconded by Mr. MARTEN, and carried.

The retiring directors having been re-elected, and the usual votes of money to the Kent and Canterbury Hospital and the Canterbury Dispensary made, the business of the general meeting terminated.

The meeting then became special to consider a proposition which the chairman explained was suggested in order to facilitate the keeping of the shareholders accounts.

It was moved by Mr. COZENS, seconded by Mr. PLANT, and unanimously agreed to—"That the 1200 A shares and 3200 B shares raised and issued by the company pursuant to the authority entered in the Canterbury Gas and Water Act, 1866, all of which shares are fully paid up, be forthwith called in and converted or consolidated into A and B capital stock respectively, and that each proprietor of A and B shares be furnished with a stock certificate corresponding in value to the amount of each class of shares now held by such proprietor."

The customary vote of thanks to the chairman, directors, and officers closed the business.

HASTINGS AND ST. LEONARD'S GAS COMPANY.

An Extraordinary Meeting of the Shareholders of this Company was held at the Gas-Works on the 4th inst.—Mr. GEORGE SCRIVENS in the chair.

The following report of the directors was taken as read:—

There are three or four newly developed districts which require mains for the supply of gas during the coming season, and the directors have given instructions for the work to be carried out during the summer.

The price of gas coal has undergone very little alteration since the last meeting, while coke still remains a drug in the market. Your directors are, however, giving both these questions their most serious consideration, so as to ensure the best results for the interest of the company.

During the past winter we have had two of the most serious leaks that have ever occurred to the company during its existence, both threatening alarming results which might have cost the company very heavy sums to pay as damages. Your directors, however, are pleased to note that in both cases the defects were overcome without either loss of life or property, although, in three or four similar cases occurring at the same time in other parts of the country, the losses from explosions were very heavy in a pecuniary sense, involving at the same time the still heavier calamity of the loss of several human lives.

The accounts, duly audited, leave a balance of £3662 19s. 6d., and it is proposed to pay a dividend at the rate of 8 per cent. per annum on the paid-up £25 shares, a dividend at the rate of 7 per cent. per annum on the £20 paid shares, and interest at the rate of 5 per cent. per annum on the new £12 paid preference shares.

Your directors have, after taking into serious consideration the dangers they were subjected to during the past winter, resolved to recommend the creation of an insurance-fund towards meeting any extraordinary demands that might from time to time occur. And they propose to place £300 to that fund this year. They also recommend £400 to be carried to the reserve-fund, leaving a balance of £37 19s. 6d. to be carried on to the credit of the next half year's account.

The CHAIRMAN, in moving the adoption of the report, said it would not be necessary for him to say a great deal, but still he would go through the several paragraphs. The first referred to the fact that the directors would have to lay some additional mains, and one in particular, which was to supply the Cornwallis estate, must have a very large inlet, so that they could not tell what the expense might ultimately come to. Then the mains in Mount Pleasant Road, which were only temporary, would have to be done, and most of the pipes were on the works. The next reference was to coal, respecting which he remarked that there was no material difference in the cost; the price was about the same as it was in the last report. With regard to coke, which was included in the same paragraph, he was sorry it hung on hand. Though the price was low, there was a large stock still on hand, and the directors would be very glad to see it diminish. The next reference was to serious leakage, which, on two occasions, was very nearly causing vast injury, and imminent danger of the most serious extent. Everybody must be thankful such danger was avoided; and he might say, although Mr. Wood was present, that their escape was largely due to the vigilant and unceasing exertions of their manager. There was a considerable breakage at the end of St. Leonard's, and likewise, to a smaller extent, in Eversfield Place. The gas escaped and got into the cellars, and if there had been an explosion he did not know really what would have been done. At Durham, where an escape took place, remedial measures were delayed, and the results were very serious. Thanks to Mr. Wood's energy, this company were spared any bad results, but he could appeal to the mayor, who was practically acquainted with an accident through the escape of gas at Colney Hatch, where the consequences were most serious. The experiences he had referred to had caused the directors to form an insurance-fund against loss from accidents, and they had commenced that fund with £300 out of the present profits, which they hoped would meet with the shareholders approval. The accounts for the last half year were made out in the usual form, except that there had been one or two changes to simplify them, and he thought the result was good as making the working account and balance-sheet clearer. The profits were £3662 19s. 6d., and the directors recommended that the usual dividends be paid—viz., 8, 7, and 5 per cent., according to the class of shares. Then, after placing £300 to the insurance-fund, and £400 to the reserve-fund, there would be £37 19s. 6d. to carry forward. The directors thought that in doing so they were not only meeting the fair expectations of the company, but—as they had always given a good and uninterrupted supply of gas of undoubted quality both by day and night—not failing in their duty towards the consumers also. He moved the receipt and adoption of the report and accounts, and that the dividends be paid on and after the 15th inst.

Mr. PRICE seconded the motion.

Mr. G. A. THORPE said, with reference to Colney Hatch, he heard from his brother-in-law, who was chairman of the gas company, that they had a very serious accident three or four months ago. There were three cottages not supplied with gas, but, owing to an escape from the mains, gas got under the flooring, which one evening a man, in lighting his lamp, ignited, and all the cottages were blown down. This accident caused the death of five persons, and the permanent injury of eight or nine others. The matter was now arranged, but it would take at least two years dividends to repair the damage and compensate sufferers. He thought, therefore, the shareholders would consider the directors of this company wise in starting the insurance-fund, for it must be borne in mind this company was liable to a similar accident.

Mr. A. H. WOOD, the general manager of the company, stated that about the time of the Colney Hatch accident there were similar occurrences all over the kingdom, though it was impossible to account for such a coincidence. At Durham, as well as Colney Hatch, there was loss of life, and the damages the companies would have to pay would be something enormous. About this same time there was a very serious leak at the end of Marina, and he was on the spot almost night and day for pretty nearly a fortnight before he got things right. The soil—if it could be called such, for it was mostly shingle—at the end of Marina was one of the worst in which gas leaks could occur. The four or six inch gas-main got broken—through a piece of timber, left in the ground when the drainage works were executed, sinking down on it—and the entire district became full of gas; it permeated the ground from No. 145 right back to No. 60. To remedy this he had to dig a deep trench lengthways in front of the houses; so that although the gas was in the road it was kept out of the houses. It was very fortunate, under the circumstances, that several houses did not go into the air. In Eversfield Place there was a similar accident, though not on such an extensive scale. Perhaps as manager he ought not to say, but as a shareholder he could, that he was very pleased the directors had started an insurance-fund.

The motion was then carried.

Mr. W. B. YOUNG moved, and Mr. REEVES seconded, a vote of thanks to the chairman and directors for their services, which was carried unanimously.

The CHAIRMAN, in returning thanks, said he wished he could see the gas charged for at a figure which would give satisfaction and a fair dividend to the shareholder, and at the same time satisfy the consumer.

This terminated the meeting.

LEICESTER GAS COMPANY.

The Half-Yearly Meeting was held on the 1st inst.—Mr. W. E. HUTCHINSON in the chair.

The CLERK (Mr. W. Billson) read the directors report, which stated that the gas and meter rental of the half year ending on the 31st day of December, 1874, as compared with the corresponding half year of 1873, showed an increase of £3925 3s. 10d. The balance available for dividends was £7303 18s. 3d., and the directors recommended dividends of 11s. 6d. per share on each A share, of 7s. 6d. per share on each B share, and of 2s. 93·5d. per share on each C share, such last-mentioned sum being at the rate of £7 per centum per annum on the amount called up on those shares. It was subject for congratulation to the directors that they had been able (although by drawing to some extent on the reserve-fund) to maintain the statutory dividends without being compelled to raise the price charged for gas. A year ago they believed that they should have no alternative but to follow the example of other companies in adopting this course. They now, however, hope that the reduction in the price of coal will render such a step unnecessary. The proprietors were aware that for many years the company's works had been conducted by Messrs. Robinson, at first as lessees of the property, and subsequently as contractors for the manufacture and distribution of gas, an arrangement which had worked very successfully for the public as well as for the company. The last contract with Messrs. Robinson expired on Dec. 31, and the requirements of a recent Act of Parliament, as well as other reasons, led the directors to think that it would not be wise to renew the contract. They had, however, arranged with Messrs. George Alfred and Charles Stephen Robinson to become the joint managers and engineers of the company's works; and from their knowledge of these gentlemen, derived from the experience of several years, the directors had reason to feel full confidence that the business of the company would be carried on efficiently. The directors reported that the works and property of the company were in a very satisfactory state. The auditor who retired by rotation was Mr. E. S. Ellis, who was eligible for re-election.

After a short statement by the chairman, in explanation of the reports and accounts, resolutions were carried adopting the same, and declaring the dividends mentioned in the report, and also a resolution that Mr. Ellis be re-elected an auditor of the company.

DERBY WATER-WORKS COMPANY.

The Half-Yearly Meeting of Shareholders was held on the 26th ult.—Mr. G. GASCOYNE in the chair.

The SECRETARY (Mr. Walker) having read the notice of meeting, the following report was submitted:—

The directors have the pleasure of submitting to the shareholders the subjoined report and balance-sheet for the past half year. The gross receipts are £5650 12s. 2d., being £217 1s. 4d. more than those of the previous half year, and £581 16s. 3d. more than those of the corresponding half year. The revenue expenditure is £2371 6s. 8½d., being £194 11s. 5½d. less than that of the previous, and £148 9s. 11½d. more than that of the corresponding half year. The net realized profit is £3279 5s. 5½d., which is more by £122 9s. 6½d. than the average profits of the two preceding half years and adding to this the surplus of £1877 15s. 4d. brought forward from the last account, £5157 0s. 9½d. now remains available for a dividend, which the directors recommend at the usual rate. The dividend will amount to £2979 19s. 3d., and leave a net surplus of £2177 1s. 6½d. to be carried to the credit of the next half year. Our contingent-fund, in addition to the above, now amounts to £3310 4s. 11d. It will thus be seen that the business of the company is slowly but regularly progressing, and that despite the constantly increasing interest payable on our large expenditure upon new works, the dividends have hitherto been steadily maintained. The cost of repairing the old engines has been unusually heavy, but at length they are pronounced by the engineers to be in a satisfactory condition. The works now in course of construction by the contractor at Breadsall for the new reservoirs and filter-beds are, unfortunately, very much in arrear—a fact which has occasioned the board extreme dissatisfaction. These works ought to have been entirely completed by the 31st of December last; but, notwithstanding all the efforts of the board and their engineers to avert it, an additional delay of several months is now inevitable. The new 18-inch cast-iron duplicate mains from Breadsall to Derby are being delivered and laid down as rapidly as possible, and will be quite ready for use by the time the reservoirs are completed, and the directors both hope and believe that before another general meeting all these operations will have sufficiently advanced to afford the town the long desired advantage of the additional water supply. After the business of the ordinary meeting is completed, the meeting will be made special, for the purpose of passing resolutions respecting the new capital. The directors who retire by

rotation at this meeting are Messrs. Evans, Handyside, and Gisborne, who are eligible for re-election. The auditor who retires by rotation is Mr. William Wallace Wallis, who is also eligible for re-election.

The CHAIRMAN, in moving the adoption of the report, remarked that, compared with the two previous half years, the last half year's receipts had increased by nearly £400, whilst the expenses had been about the same, being, in fact, £23 on the average less. The balance carried over, after paying the dividends, would be £2177 for the last half year, or £300 more than at the end of the previous half year, which was a welcome addition in view of the large extra amount of interest which would be payable in the next half year, on the very great additional amount of capital which the new works would absorb. They were, in fact, in the very heart of their expenditure, and the works would have been completed long ago had the contractor not been so far behind with his work, though the directors had taken every possible step to remedy that state of things. They hoped, however, that by July the works, if not completed, would be so far advanced as to enable them to supply the water to some extent to the highest levels, though not, perhaps, in extreme quantity, and that a few months later, and long before Christmas, the works would be entirely completed. They had by their last Act doubled their capital, and in six and a half short years since their former Act was passed they had expended £52,560 in extensions, and the interest on that could not have been met except from the extreme increase in building, which had added £3500 to the annual revenue. In the last half year 435 additional houses, shops, gardens, or closets had been supplied with water, of some £9 or £10 average value, and in the six and a half years no less than 3080 new services had been put on. But for that great increase in the consumption of the water they could not have met the interest on the augmented outlay. The great extension of their works would probably soon render it necessary to have a general manager, and the engineer pressed that very strongly, especially as the means of avoiding the large waste of water which takes place. The extension of the undertaking would require some one to take the general supervision of every department, and the directors would probably see the necessity of making such an appointment. Referring to the increased rating of the company, he might mention that under the new assessment the rateable value of their property had been raised by £456. But for the struggle against it by the directors, the assessment would have been increased by £850. They would have to encounter the question again when their new works were completed. After again referring to the annoying delay of the contractor, the chairman said the prosperity of the company so far had been achieved without any harshness on the part of the board towards their customers, in which respect they compared very favourably with other towns. Notwithstanding the high prices of coal and labour, they had never raised the charge for the domestic supply, which they might have done, under the powers of their Act, by a third, and he believed by more than 40 per cent. —he thought as much as 46 per cent. The directors were paying attention to the question of waste, and would not lose sight of it.

Mr. HANDYSIDE seconded the motion for the adoption of the report, which was agreed to.

Mr. HUISH proposed, and Mr. H. EVANS seconded, the declaration of dividends of £1 5s., or at the rate of 10 per cent. on, the original shares, and of 6s. 1½d., or at the rate of 7 per cent., on the remaining shares, which was agreed to.

Mr. H. Evans, Mr. Handyside, and Mr. H. F. Gisborne were re-elected directors.

The meeting was then made special for the purpose of increasing the capital of the company by the issue of the new shares to the amount of £80,000, as authorized by the last Act, and by calling up the remaining unpaid capital on the shares last issued. The recommendations of the board in reference to these matters were agreed to, and the meeting separated after passing a hearty vote of thanks to the chairman and the directors.

NEWCASTLE AND GATESHEAD WATER COMPANY.

The Annual General Meeting was held on the 24th ult.—Mr. R. B. SANDERSON in the chair.

The CHAIRMAN moved the adoption of the directors report, the chief points of which are touched upon in his remarks. The first portion of the report was as to the income. The increase this year was only £776 15s. 5d., and that, as the report stated, arose from two causes. The first was that their meter accounts, during a great part of the last autumn, were necessarily restricted. It was their duty, with the view of maintaining the domestic supply, to restrict the supply to the manufactories. The latter supply, however, had to be given to a considerable extent, inasmuch as not only the works themselves, but also the employment of a very large number of the population, depended upon it. But that had not been the only cause. Owing to the depressed state of the chemical trade and other trades, the meter accounts at the present moment were not in so satisfactory a state as they had been for some time. They did not anticipate that the depression, at any rate with the present severity, would last long; and they would then come back to a time such as they had had for some years past, though perhaps not to such a period of inflation as was recently experienced. Therefore, he did not think the shareholders need take any discouragement from the fact that for this year the increase was only £776 15s. 5d., instead of perhaps a couple of thousand pounds. The next point was the drought of unusual length experienced in the summer of 1874. Since he entered the company in 1862 they had had some very dry seasons, and they had suffered to a great extent in some parts of the district from drought; but they had never had anything like the drought of 1873-4. He did not think it had appeared possible to anybody that they could have had so small a quantity of water as had been collected. They only calculated upon a moderate rainfall, and they found that during the 18 months all the water might have been collected from a rainfall of under 6 inches, and the rainfall of the district was 33 inches. That did not appear to them to have been possible, and it really was the cause of the difficulty in which the company and the town had been placed. Their gathering-ground was 17,000 acres in extent; the gathering-ground of the Manchester Water-Works was only 18,900, and they had to supply 25 millions a day in compensations and to the city, against our 7 or 8 millions a day here. We had also 7000 acres more than Liverpool. The last season was very peculiar. The drought arose not so much from rain not falling, but for the falls during the whole of the winter being five or six hours, and succeeded by heavy winds—gales, in fact—from the south-east, which stopped the streams and prevented them rising, and dried up all the water that had fallen, so that during the whole of that winter we never had anything like a flood in any of the streams. It had affected the whole of the east coast; and there were at this time heavy claims for compensation for pits stopping because they ran short of water for the supply of their men, in places where hitherto they had drawn an abundant supply from a depth of more than 50 fathoms. In the Cheviot range the springs had been in such a state as they had never been before. That was really the cause of the deficiency. The company had been abundantly blamed, and at one time his life was anything but pleasant. He was the best abused man in the town, and he really had no more to do with it than with the Indian famine. However, he had to bear it, and do the best he could for the company. Had they not had the engine at Newburn, things would have been infinitely worse; but the use of that engine had involved an increase in the cost of coals of about £4000. Now, there came the possibility of that happening which had happened before, and it was incumbent upon the company forthwith to put themselves in such a position as would enable them with greater facility, and much greater economy, and much greater satisfaction, to meet that emergency if it occurred again, and to meet it forthwith. A great many schemes had been laid before the public, and the company had had a great deal of gratuitous advice, and a great deal of it was of a very ludicrous character, though some of it was more substantial. The whole of this, during the difficulties they had had to deal with, they had taken no notice of. Whatever scheme they adopted must involve a delay of two or three years; the shortest period was two years after they had got their bill; and if the works were to be effective the time would be four or five years, because reservoirs could not be constructed in a hurry. Mr. Bateman, than whom no man had a higher reputation or more experience, reported with reference to one of the banks at the Liverpool works that nine years would be necessary. It so happened that the company could immediately do what was necessary. In 1870, with the view of fortifying themselves against these contingencies, and thinking that within four or five years it would be necessary, they acquired powers to take water from the river Tyne at a point three or four miles above the point where they at present took it, and to which the tide would eventually reach by the operations of the River Tyne Commissioners. The Town Council got a clause inserted as to filtration, and this showed that the council thoroughly understood the design the company had in view, and it was agreed that they were to take the water at this point, so that the corporation could not go before any tribunal and say the thing was done in ignorance. The directors were now proceeding with those works. They commenced them at the early part of last year, not knowing what the severity of the drought would be; but, thinking it wiser to come to a conclusion in the middle instead of waiting to the end of the present engines, which consumed an undue quantity of coal, they entered into a contract in the middle of last year with the builders of most of the engines of the London water-works, for the erection of engines capable of pumping 3½ millions, and, if necessary, 4 millions per day; and the engine was in course of construction, and would be completed about June or July. The consumption of coal would not exceed 3 lbs. per horse per hour on the indicated power, and if they could get coals at anything like 10s. a ton—which he thought they could—they ought not to pay for every million gallons they pumped much above £600 per annum, which would be a very large saving upon the quality of coal now used. This engine would enable them to maintain a supply of from 3 to 4 millions a day extra to that they have, if emergency should require it. He was happy to say that at the present moment the reservoirs were full, and for six weeks past at least they had been running over, and probably they would run over for some days; and therefore, if pumping were required next summer, it would be to an exceedingly limited extent. Therefore, if they met with this difficulty again, they would be in a position to pump the water up into the reservoir, and to keep the supply fully and permanently good. Another advantage would be this. During the latter part of last year there was not only a question about the quantity, but also about the quality of the water. The quality was interfered with by the fact that the reservoirs were very low, and, in addition, the water which came down from the hills was largely stained with peat. The North Tyne was hardly ever free from some degree of brown stain, and although that peat stain was in no sense noxious, yet it could not be got rid of without its lying some time in the reservoirs. When it lay exposed to the light a great part of the colouring went off. The clear and bright Loch Katrine water came from a loch quite as brown and peat-stained as any in this country. The colour cleared away on its lying and becoming bleached in the reservoirs, and this they would now obtain. The reservoir held pretty nearly 200 million gallons, and the water would be allowed to lie there for from a month to six weeks; and it would be drawn from the river which, for the population upon it, was the purest in England, and which would compare favourably, at any rate, with the Thames and the enormous population upon its banks. Although it would cost something more, they had also determined to filter the water, and he had no doubt the Local Government Board would insist upon that being done all over England. As to the extension of the gravitation works, he understood the Ulleswater scheme was to cost a good part of a million of money, and he had never yet seen where the interest or the capital was to be raised. Then, as to the Northumberland lakes, Mr. Bateman's report gave a very different result than that of another gentleman. The Warks Burn and Blackaburn scheme gave a drainage area of 7800 acres for the former and 2800 for the latter, making 10,600 acres, with an average rainfall of 12 inches; and the Warks Burn would give 230 million cubic feet, or 5½ million gallons per day. Blackaburn, with 84 million cubic feet, would give 1½ millions a day, making 7 millions per day. That was Mr. Bateman's estimate, and the cost of the Warks Burn reservoir would be £108,000, and of the Blackaburn £41,500—total, £149,500; the cost of an aqueduct and syphon to bring the Warks Burn would be £73,500, and the Blackaburn £18,500, making the total £241,500. That was the scheme which at present found most favour in the minds of the directors, and, when fully matured, it would be brought before the shareholders. The cost of the Northumberland Lake scheme would be £238,369, and the supply 3,900,000 gallons per day. There was also an impounding district further north than the Warks Burn, so that he thought there was no fear of Newcastle and Gateshead, if necessary, being abundantly supplied from this district. The works would be executed in steps, but four or five years must elapse before the first was completed. They had now received official notice of the resolutions passed by the Newcastle and Gateshead Town Councils, with the object of opening negotiations for the purchase of their works, and they had asked for an interview. It was not for him to say what the result of that interview would be; but the directors would take good care, having regard to the interests of the shareholders, to look at the matter in a thoroughly businesslike way, and to come to no terms without consulting the shareholders. He saw no novelty in the project; the Glasgow, Liverpool, Edinburgh, Manchester, and other works had been purchased by the corporations; and he had no doubt the terms of purchase could be obtained, and that, of course, would form a guide to the directors. He knew a great deal had been said about the company being in default, but it seemed to be forgotten that the undertaking of the company was not to supply water in any contingency, but to supply water if not prevented by "unusual drought," and, if ever a drought was unusual, that of 1873-4 undoubtedly was; and, therefore, the company had in no sense come short of their obligations, and when their gravitation works failed, they left no stone unturned to satisfy the demand. A good deal had been said about having taken in additional districts, but these out-districts must have had water, and if not supplied by this company, a new one might have come into the district. Besides, without the income derived from these out-districts, they would not have been able to pay the dividend now proposed.

Mr. Alderman PLUMMER seconded the motion.

Mr. W. GRACE said that pumping from the Tyne had been so thoroughly condemned by all the public bodies, that he was disappointed to find the chairman still adhering pertinaciously to his pumping scheme. He believed that some extension of the gravitation works would have satisfied the public more than this pumping from the Tyne. He thought that adhering to that principle was bringing discredit on the company. It was evident that Hallington had disappointed them, or why was there not a larger quantity of water supplied. He believed they would get a larger quantity of water from Reed's Water and Coquet Head than from Warks Burn; and, to go there, they would dispense with all this pumping, which cost a very large sum of money, and get much better water than out of the Tyne. With regard to the disposing of the concern to the corporations, it must be evident that the works were not such bad works after all, provided they were properly conducted; but he considered there had been far too much amateur engineering, and the sale had better be carried out. It would be much better in the hands of the corporation than the hands it was in at present. It was quite clear it was not so bad a concern, provided it was judiciously managed. As to filtration, it would be necessary under any system.

Mr. WATSON, asked if the Hallington reservoir was kept in good order.

The CHAIRMAN replied that it had never been otherwise. There was not a leak or a fissure in it. There was not a work of the company so satisfactory in its construction as the Hallington reservoir.

Mr. WATSON thought the whole scheme of Mr. Bateman had not been fulfilled; and as to the pumping, it must become worse and worse every year as the population on the banks of the Tyne increased.

Mr. J. B. ALEXANDER said it was supposed that the Ulleswater scheme would cost a million of money. The interest of that at 5 per cent. would be £50,000 a year. That would require them to exactly treble their present income, £25,000 being about the divisible profit made by the company in the year. The Northumberland Lake scheme would cost about a quarter a million, and the interest on that would be about £12,000, which would require 50 per cent. additional revenue to meet the interest. He did not think any shareholder would conceive it possible that within any reasonable time they would obtain three times the profit they now do, so that the Ulleswater scheme seemed altogether impracticable.

The CHAIRMAN said that the water of the Tyne was proved by Dr. Letheby's evidence, and since by Mr. Pattinson, and also by another gentleman who had lately analyzed it, to be unexceptionally good, if properly dealt with, and there was no substantial reason against the use of this water. There was, however, a prejudice against it, but that prejudice would condemn nearly the whole of the metropolitan supply as well as the supply of a very large number of towns throughout England. Taking water from the Tyne was the most economical way of maintaining the supply at the present time—a supply which might not run short once in fifteen years. With reference to the Hallington reservoir, they went there by the advice of Mr. Tone, who really was the man who had found fault with them lately, and in reality they always got an average of two or three inches more rainfall in the Hallington than in the Whittle Dene district. Something had been said about judicious management; but he did not expect that when the water company got into the hands of the Town Council it would be better managed, except in one way, and that was that money would be more easily got at, and that the rates would be a good deal more available than at present. He thought they would find that the cost of pumping under those circumstances would be much less than the interest on the necessary gravitation works for the same quantity of water.

Mr. WATSON believed that by the Ulleswater scheme they would get good water, but it was at much too great a distance, and he thought there would be enough in the North Tyne.

The CHAIRMAN said there had been some talk about the Hexham sewage falling into the Tyne; but it only provoked ridicule on the part of those who knew it. If those ideas were true, London, getting its water from the Thames, into which the sewage of Oxford and other towns flowed, would never be free from typhoid fever, and yet London compared favourably with any other part of the world for healthiness. He would not have sewage if he could avoid it; he would have the whole of the water collected from a slated roof. Look at the ammoniacal manures which were spread over the gravitation districts, and see the rapidity with which these manures ran off the ground. They might have to divide the supply, and have a double set of pumps—one for manufacturing and one for domestic supplies—and that would not cost so much as might be supposed. It was a very difficult thing when they had to deal with water, which was an unknown quantity, and whoever took the works would have to go on with the pumping, which, however, would be used only in case of necessity.

The motion was put, and carried unanimously.

The directors and auditor were re-elected; the board were empowered to raise the remaining £50,000 of capital authorized by the Act of 1870 by creating new £5 shares, having preference dividends at 5 per cent. per annum; and a dividend was declared of 2½ per cent. for the past half year (making with interim dividend paid in August, 4¾ in the year) on original stock, and 2½ per cent. on the preference shares.

The proceedings closed with a vote of thanks to the chairman and directors.

BIRMINGHAM WATER-WORKS.

PROPOSED PURCHASE BY THE CORPORATION.

A Public Meeting of Ratepayers of the Borough of Birmingham was held in the Town Hall, on the 26th ult.—Alderman BIGGS, in the absence of the mayor from domestic affliction, presiding—"to enable the ratepayers to signify their consent to the council applying to Parliament for an Act to empower the corporation to purchase the undertaking of the Birmingham Water-Works Company." There was a very meagre attendance, which the chairman attributed to the great confidence the inhabitants of Birmingham felt in the proceedings of the Town Council on this question.

Alderman HAWKES moved—"That the council of this borough be authorized and empowered to make an application to Parliament for an Act for empowering the mayor, aldermen, and burgesses of this borough to purchase the undertaking of the company of proprietors of the Birmingham Water-Works, and for other purposes." After giving an account of the steps which had been taken, he said the question which would be most looked at was that of price, and, with regard to that, he explained that whilst the corporation were ready to pay such a sum as would secure to the shareholders of the company the maximum profit which the law allowed them to obtain, they would give no more. He believed that if the vote of the shareholders of the company was taken by ballot, they would be in favour of such an arrangement; but, unfortunately, there were other people who were not only shareholders but directors, who had their solicitors and legal advisers around them, and who received large directors fees every time they sat to direct the business of the company. Of course, those directors would not be influenced by any pecuniary consideration, but they might feel that as the company was a bantling of theirs it ought not to be taken from their management. He was not sanguine that the bill would pass, as he looked upon it very much as a matter of litigation in a law court. While the matter was before Parliament an attempt might be made to obtain extortionate terms or terms beyond those which he had named; but he thought he might say for the General Purposes Committee and the council that, if an attempt was made to insert clauses by which the town should be mulcted by having to pay a great premium beyond a business price, they would at once abandon the bill.

Alderman AVERY, in seconding the resolution, said the price they should have to pay to the water-works, under the most favourable circumstances, would be very large, and perhaps startling. It was a responsibility which the authorities of the town would have to recognize, that whilst they would not give any extravagant or absurd price, they ought to be able to give a full, reasonable, and just price. If they paid more than some persons thought prudent, let them recollect that, for the last 40 years, every 10 years the gross income of the water-works and the net profits were doubled; so that the progress of the town was so continuous; and if in the first place they should be induced to give the price which they regarded with some degree of alarm, the increased population and consequent consumption of the water would gradually and rapidly recover and repay to the ratepayers any sum of money which they might have to give. In 1851, when the corporation first had the courage to look this question in the face, the sum which they inserted in the Act was £250,000. About six years ago he strongly urged this question upon the council, and the state of things which prevailed in 1869 was this—the paid-up capital of the water-works company was £420,000; the capital authorized by the Act of 1866 was £336,000; authorized to borrow, £189,000; making a total, including mortgage debt, of £945,000. At that time the premiums, as per Stock Exchange quotations of the market value of shares, was 9600 £25 shares, £8 premium, £76,800; 9600 £18¾ shares, £5 premium, £48,000—making a total of £124,800. The total amount of the value of the company, according to that market value, was £1,069,800. That was only six years ago. Now let them notice the state of affairs which prevailed to-day. In 1875 the paid-up capital had increased to £638,400; the capital not yet paid up was £117,600; authorized to borrow, £189,000; making a total, including mortgage debt, of £945,000. The premiums, as per Stock Exchange, were 9600 £25 shares, £19 premium, £182,400; 9600 £18¾ shares, £14 premium, £134,400; 9600 £20 C shares, £7 premium, £67,200; 9600 £15 D shares, £5 premium, £48,000; making a total of £432,000, and giving a grand total, including capital not yet called and mortgage debt authorized to borrow, of £1,377,000. The works of the company represented fairly the money that had been spent; but the standard of measurement was the difference in the value of the premium upon the shares; and whereas the amount of that premium upon the market value in 1869 was £124,800, the present sum was £432,000, representing an increase in the value of premiums of £307,200. He deplored this state of things; but what they had to do now was to recognize the facts as they actually existed. He had a strong conviction that the purchase must ultimately be made, and the longer they waited, the more they would have to pay, and, therefore now was the proper time for action. The sum which the corporation named in the bill for the purchase was about £1,000,000. To that must be added certain sums not yet called up, and the mortgage debt. There was reason to suppose that the directors would require a very much larger sum, and to avoid all dangers, it would be proposed that the corporation should have compulsory powers of purchasing, and, if they could not agree with the company as to the price, they would agree that it should be settled by arbitration. If Parliament insisted upon some high and unreasonable price being given, then, no doubt, it would be the duty of the corporation to abandon the enterprise altogether.

After some conversation, the motion was put and carried, and a vote of thanks to the chairman closed the proceedings.

SOUTHAMPTON GAS COMPANY.

PROPOSED PURCHASE OF THE WORKS BY THE CORPORATION.

A Meeting of Ratepayers and Owners of Property in Southampton was held, under the presidency of the MAYOR (Mr. Passenger), on the 3rd inst., to consider the bill promoted by the corporation for acquiring the undertaking of the gas company. In introducing the subject, the mayor stated that negotiations were at present going on between the gas company and the corporation, and he had no doubt they would be able to settle the matter amicably, and in such a way as would be conducive to the best interests of the town. He concluded by moving a resolution to the effect that the meeting assent to the corporation going to Parliament for powers of purchase.

Alderman BARTLETT seconded the motion.

Mr. BRIDGEN said it did not appear at all clear to him that the course upon which the corporation were entering was one upon which they could be congratulated. It would be better to obtain possession of the works by agreement.

The MAYOR pointed out that even if an agreement were come to, the corporation would require statutory powers to carry it out.

Mr. BRIDGEN said he should like to hear the reasons why it was supposed the Town Council could manage the gas-works better than the present company. It was clear they could not obtain the works except at the market price. The company had extended their mains to Eling, Woolston, and other places, and the Legislature would not let the corporation take the works as regarded the town without these, what he called, unprofitable extensions in the outlying districts. Then as to raising the money for the purchase, they could only do it on the security of the rates, which were paid by non-consumers as well as consumers of gas.

Mr. JAMES disapproved of the proposed purchase, and reminded the meeting that the Corporation of London and the Metropolitan Board had just been compelled to abandon a similar project for the metropolis, on account of the enormous expense of such an undertaking. He moved as an amendment, that the meeting do not approve of the purchase, considering that the ratepayers are already heavily taxed.

The MAYOR declined to receive this or any other amendment.

Mr. CHURTON asked what was the estimated cost of purchasing the works.

The MAYOR said he could not mention it, as it was a matter of negotiation between the corporation and the company, and what had occurred was to be "without prejudice."

Mr. CHURTON said he believed that in proceedings of this kind, 25 years purchase of the statutory dividends was generally recognized as the price to be paid; and if that were so the expense would be £250,000.

The MAYOR said it would not come to nearly so much.

Mr. CHURTON said the capital of the company must be £120,000 or £130,000. Taking the latter amount, 10 per cent. profit would be £13,000, and 25 years purchase of that was £280,000. If the dividend was only £10,000 a year, it would come to a quarter of a million. The rate which would be levied in respect to the purchase would not be, he estimated, less than 1s. 8d. or 2s. in the pound per annum; and he would ask the ratepayers who were not gas consumers, if they were willing to pay this sum for the benefit of those who were. He put the number of ratepayers in the town at 9000, of whom only 4000 were gas consumers; therefore 5000 ratepayers would be called upon to contribute 2s. in the pound to benefit gas consumers. And how would gas consumers be benefited by it? Was it proposed to reduce the price of gas? Why, the proposed Act gave the corporation power to charge 5s. per 1000 feet, whilst the present Act only allowed 4s. 6d. to be levied.

Mr. LEMON said Mr. Churton had been calculating the dividend of the company at 10 per cent., but some of their capital did not pay more than 5 or 7 per cent.

After a lengthened conversation, the question was put to the vote, and declared to be carried by a large majority.

The meeting was very sparsely attended.

LONGTON GAS COMPANY.—At the meeting of this company on the 26th ult., the directors reported that during the past half year the cost of materials and wages for making gas had continued very high, while the amount received for coke was less than half the amount realized for the corresponding period of 1873. The gas-rental showed an increase of about 6 per cent., and the receipts for tar and ammoniacal liquor were considerably more when compared with the same period; they, however, did not compensate for the high price that the company had paid for coal. After payment of interest on mortgages, there remained in the profit and loss net revenue account a sum sufficient to pay the dividend of 10 per cent. per annum on the original shares, and 7 per cent. per annum on the first and second issue of ordinary 7 per cent. shares, and the directors recommended that the above dividend, free of income-tax, be declared. The capital account showed an expenditure of £2532 19s. 5d. in the erection of a new retort-bench and purifier, and the enlargement and rearrangement of the street-mains and distributory plant of the company. During the last winter there was a plentiful supply of gas over all the company's district at low pressures. The directors are promoting a bill in Parliament for the extension of their limits of supply and for other purposes, and such bill has been approved of by a general meeting of the shareholders called for the purpose, but the Town Council of the borough have passed a resolution to oppose the bill. A deputation of the Town Council had waited upon the directors for the purpose of ascertaining the terms on which the undertaking of the company could be purchased, and the directors had proposed such terms for the sale of the same, as in their judgment were fair and reasonable, and which in due course would be submitted to the shareholders for approval or otherwise.

ON THE POLLUTION OF RIVERS.

By Dr. FRANKLAND, F.R.S., &c., &c.

The following Lecture was delivered by Dr. Frankland at the Royal Institution, on Friday Evening, February 19th — His Grace the DUKE of NORTHUMBERLAND, K.G., President of the Institution, in the chair.

Nearly ten years have elapsed since a Royal Commission was issued for an inquiry into the present use of rivers in England for the purpose of carrying off the drainage of towns and populous places, the residues arising from industrial processes and manufactures, and to see how far these drainages and this admission of refuse can be prevented, without risk to the public health, or serious injury to such processes and manufactures, and how far such drainage can be got rid of otherwise than by its discharge into rivers, or may be rendered harmless before reaching them. An inquiry was also to be made into the water supply of Great Britain.

The commissioners appointed were Mr. R. Rawlinson, Mr. Thornhill Harrison, and Professor Way. Their inquiries extended over three years, and they reported upon the Thames, the Lea, the Aire, and the Calder, and their labours are recorded in the three volumes which are on my right hand, with their appendices. This commission was dissolved in the year 1868, and a new one appointed, consisting of Major-General Sir William Denison, Mr. John Chalmers Morton, and myself. We were directed to complete the inquiries entrusted to the previous commission, and to extend them to Scotland. This second commission finished its work in June last, and its labours are recorded in the six volumes, with their appendices, which I have on my left.

Now the problem confronts me how to convey to you, in the short time at my disposal, the contents of these nine Blue Books. Besides the inspection of river basins, towns, and manufactories, and the holding of courts of inquiry in the more important towns, these investigations involved the experimental examination of numerous processes for the cleansing of foul water, and the execution of thousands of analyses of foul and purified water. For this purpose a thoroughly equipped chemical laboratory, furnished with every requisite for the investigation of samples of water, which modern science could suggest, was established, and whatever imperfection may attach to the work in the laboratory, no one can charge upon the Government a want of liberality in furnishing us with everything necessary for the purpose of our investigation. Three and sometimes four assistants were provided to help us in this work, and our thanks are specially due to Mr. Thorpe for the valuable aid he gave in that laboratory during the whole course of the inquiry by both commissions. The appendices to these nine volumes contain a great mass of statistical information, and for this we are much indebted to our secretary, Mr. S. J. Smith, who was most indefatigable in obtaining this information from corporations and manufacturers capable of furnishing it.

It will be convenient for us, in considering this mass of matter which is to engage our attention to-night, to divide the polluted liquids discharged into rivers and streams into—1. Town drainage. 2. Drainage from the various forms of fibre manufacture (and under this denomination, of course, will come paper-making, the calico industry, the woollen industry, the linen and jute industries, and also the silk manufacture). 3. Mine pollution or liquids discharged from mines. 4. Drainage from chemical works.

I have here a map which gives you a rough notion of the extent to which river pollution in Great Britain has, up to the present time, extended. You see here a number of river basins shaded of a darker tint than the rest. All these river basins are more or less polluted—some of them intensely polluted, others much less so. It is true that in this respect they differ from each other very much, and some of them might, perhaps, be classed with unpolluted waters. But, on the other hand, several—I may say many—of these river basins are represented as unpolluted altogether, which are not so tinted, although they are slightly fouled, and some of the affluents of such streams are intensely polluted. Nevertheless, the general character of the basin being that of unpolluted water, we have not tinted these basins. Therefore I think this map very fairly gives you the extent of river pollution in Great Britain.

Beginning at the top, you see it does not extend to the extreme north of Scotland. The farthest point visited by the commission was the river Ness; but though our experience did not go beyond that point, I know that rivers farther north are unpolluted. At Inverness you will find a small part of the map shaded. The Ness as it flows out of Loch Ness is polluted by the refuse from a woollen manufactory, and by the drainage from Inverness itself. Still the course of the river from the point of pollution to the sea is only short. Then we have the Don, a little to the north of Aberdeen, flowing into the sea along with the Dee. The Don is polluted with one species of fibre manufacture—paper-making. Coming down now to Dundee, a little to the north of that town we have a stream called the Dighty Burn, which is very horribly polluted by the linen and jute manufacture. This is a small stream comparatively, but it runs through some parks and grounds below the place where the pollution takes place, and it is a source of great nuisance there.

Now the Tay itself, coming out below Dundee, is also a slightly polluted stream, but so slightly polluted that we have taken no notice of it. The sources of pollution are, however, increasing year by year, and it will no doubt become worse unless care be taken, that the liquids be cleansed before entering the river.

We now come down to a lower position on the map—viz., to Edinburgh, and there we have a considerable mass of water polluted, extending from the east coast right away to the west. We have, in fact, the Clyde, which flows through Glasgow very much polluted by town drainage, by the fibre manufactures, and in one of its higher reaches by lead mines. Then we have the North Esk, polluted by fibre manufactures, above Dalkeith Palace, and the Water of Leith, which is in an extremely foul condition, where it joins the Firth of Forth. The Clyde, however, is much less polluted than many of the rivers we have to complain of in England.

Then we come down to Newcastle, and there we have another stream—viz., the Tyne, strongly polluted by town drainage, and by chemical works principally. Immediately below that come the rivers Wear and Tees, which are strongly polluted by sewage and by the mining operations carried on near the head waters of those streams.

Coming still farther down the map, we reach those important seats of the cotton and woollen manufacture—viz., Lancashire and Yorkshire, and here we have, in Lancashire, the Ribble and the Mersey horribly polluted by the discharges from calico-print works, from paper factories, from chemical works, and also, to a great extent, from town drainage. On the other side, or towards the eastern shore, we have the woollen manufacture developed to an enormous extent in Yorkshire, polluting strongly the Aire and the Calder, which enter the Humber lower down. The Wharfe, which flows down to Leeds, is still an unpolluted stream, and the smaller Ouse, which runs through York, is represented as unpolluted, but it receives a considerable amount of town sewage from York, and also from smaller places up the river.

Then we reach the Don at Sheffield, which is polluted by the iron and steel manufacture, the refuse from the grindstones of Sheffield, and also by a large amount of town sewage. Turning to the Rother basin, we have mines polluting nearly all the head waters of the stream, and pollution by town drainage in the lower reaches of the river. At Birmingham, we have the Tame, a tributary of the Trent, also strongly fouled by the drainage of Birmingham—partly town drainage and partly the refuse from some of the metal manufactures. The Trent, also, is strongly polluted from the Pottery district by town drainage, the pottery trade scarcely adding anything to the general mass of refuse matters. We then come to the Nene, which receives the drainage from Northampton, and which was a year or two ago very considerably polluted by that drainage, although processes for its purification were being employed at that time. Now, I believe, there has been set in operation, or is ready to be set in operation, a more effective method of dealing with the drainage of that town, and probably some of the pollution of the basin of the Nene has ceased.

We next arrive at the Thames basin, which, as you see from this description, is polluted by fibre manufacture. The fibre manufacture on the Thames is that of paper, carried on upon a large scale, chiefly in the tributaries of the Thames, and scarcely suspected by those who pass up and down the river in steamers and rowing boats. Then we have here the drainage of about 600,000 people passing into the river and its effluents before it reaches Hampton, and, of course, below London, but within the tidal estuary, we have the whole of the drainage of the metropolis poured into the river.

Then, lower down, there is the Avon, which runs into the Severn, polluted by fibre manufacture and town drainage; the fibre is chiefly woollen cloth. It is also polluted by tanneries. Coming down into Cornwall, we have small river basins, chiefly polluted by mines. There is a celebrated river, the Red River, which is worked almost from its source to the sea for the recovery of the tin ore which is suspended in it, and the industry extends out to sea, so that the sea sand near is washed to get back the tin ore. Similarly in Wales there is a number of small river basins strongly polluted by mines, and also by town drainage. The three rivers which come out near Aberystwith, the Rheidd, the Ystwith, and the Clarach, are strongly polluted by lead mines.

This glance at a large map gives us the comparative areas of polluted and unpolluted river basins, but it does not distinguish between those which are strongly polluted and those which are, comparatively, still preserved in a pure condition. It is, therefore, necessary to supplement the map by a diagram, showing the comparative pollution of some of the more important of these rivers. And, to begin with, we have, at the head of the diagram, the Thames itself at its source. Now, the Thames, at its source, is certainly an unpolluted river; indeed, the amount of impurity, in the strictest sense of the word, is so small that it may be regarded as a vanishing quantity.

I must, however, explain the plan of this diagram. You will see, by the side of the headings used, three lines—one red at the top and another at the bottom, with an intermediate black line. The uppermost red line represents organic polluting matter in solution in the water; the middle black line represent mineral matter in suspension (mineral matter which, if allowed sufficient time, will subside of its own accord in the water); and, lastly, the lower red line indicates organic matter in suspension, as distinguished from the upper red line, which signifies organic matter in solution.

Now, if you cast your eyes down the diagram to the right, you will be able to compare the pollution of these different streams with each other. There is the Thames, for instance, at its source; you trace it as it receivespolluted matters from the paper manufactories, and from the drainage of the 600,000 people in its course, till you see what the condition of the river is at Hampton. And you will observe that, though there is a very serious amount of pollution in the Thames at Hampton, it makes a small figure on the diagram when compared with the polluted matter in other streams which are here mentioned.

The Thames at Hampton is second upon the list; then we come to the Thames at London Bridge, and you will see that it differs chiefly there from its condition at Hampton, by having in it a larger quantity of suspended matter, the greater part of which is mineral mud, which has been stirred up by the steamers. And you will notice, on comparing the slips of coloured paper, that the quantity of organic matter in solution is scarcely perceptibly greater at London Bridge than at Hampton. In other words, if efficiently filtered, it would be, chemically speaking, very much the same water there.

Going lower down, we have the Irwell below Manchester, which you see is distinguished by having a much larger proportion of organic matter in solution, as well as a considerable quantity in suspension. Then there is the Cornbrook as it enters the Irwell at Manchester, which has also a large quantity of organic matter in solution, as well as a great quantity in suspension.

We come next to the Aire below Leeds, which you see is less polluted than the Irwell below Manchester. Again, here is the Bradford Beck, a tributary of the Aire, frightfully polluted by organic matter, both in solution and in suspension. With regard to the organic matter in solution, I may remark that the red line indicates only two of the elements of organic matter. Chemistry is not yet able to determine the actual weight of organic matter in solution. Only two of the principal elements, carbon and nitrogen, can be determined, and these are represented by the upper line. That must be regarded, therefore, as being of much more value in reference to impurity than the line representing the organic matter in suspension.

If you look down the diagram, you see instances of other rivers varying very considerably in the amount of polluting matter contained in them. But time warns me that I must hasten on, and therefore I will take a case which is a medium case of a polluted river—viz., the Aire below Leeds—the Aire and Calder, taking the two together. The Aire rises in Yorkshire, a very pure and beautiful river, but before it reaches Leeds it receives, besides the house drainage of more than a quarter of a million of people, the refuse from the following factories:—1341 cloth and woollen factories, 1 silk mill, 1 flax mill, 10 cotton factories, 7 paper mills, 26 tanneries, 13 chemical works, 8 grease works, 4 glue factories, and 35 dye works. These all enter the river above Leeds. Some notion may be formed of the extent to which a single woollen factory can pollute such a stream when I mention that, in one of these factories alone, the following materials are annually used:—320,000 lbs. of logwood and other dye woods; 15,000 lbs. of chloride of lime, ammonia, and sulphuric acid; 40 to 50 tons of Gallipoli oil; 700,000 lbs. of soap; 40,000 lbs. of alkali, and 14,000 tons of coal. With the exception of the last item, nearly the whole of the other materials are discharged into the river, and the ashes of the coal also find their way to the same convenient destination.

Now the nature of the discharges from these factories is seen in the upper part of the other diagram. The strips of paper are upon the same scale as those in the first diagram. These are the intensely polluting liquids, which, when mixed with the general mass of water, pollute it to the extent shown in the first diagram. You see many instances there of these fibre factories contributing liquids of enormous polluting power.

At Leeds this mass of pollution is reinforced by the drainage of 300,000 people, and by refuse materials from the following factories:—224 cloth and woollen factories, 62 dye works, 6 dye-wood mills, 25 flax mills, 22 paper mills, 7 soap works, 1 silk mill, 28 tanneries (which tan 2¾ millions of hides annually), 29 chemical works, 10 carpet factories, and 3 glue factories. When we consider the vast number of works, and the vast population at this spot, we can only wonder that the pollution is not greater than it is. We see also how much more other rivers must be abused than this, and what an astonishing catalogue the factories discharging into the Irwell and other streams would form.

The history of the Calder which joins the river Aire lower down is similar, but that river is less intensely polluted. As soon as it receives the drainage of the last town its water is pumped up for the supply of Wakefield. The condition of the water may be judged of from an example of a document handed to us by a facetious manufacturer on the banks of the stream below Wakefield. It was as follows—"This memorandum, dedicated without permission to the Local Board of Health, is written with water taken from the river. Could the odour only accompany this sheet, it would add much to the interest of the memorandum." Mr. Clay, who gave us this memorandum, dipped his pen into the river and wrote the document, which is pretty closely copied in the *fac simile* I now exhibit.

Now these two rivers, as you see—the Aire and Calder—the one running from Wakefield and the other from Leeds, meet at Castleford, and there they fall over a high weir. The water at that spot is not only very black, but even the foam upon its surface is black. I once passed from the Falls of the Rhine, at Schaffhausen, to the Falls of the Aire at Castleford, in the course of a week, and I can assure you the contrast was very striking. But these streams must formerly have been celebrated for their cleanliness and purity, otherwise the well-known couplet would never have been written:

Castleford lasses may well be fair,
Wash'd in the Calder and bathed in the Aire.

Certainly, the water of these rivers would have quite an opposite effect at the present time.

The accounts of the pollution I have now mentioned are those from town drainage and fibre factories, and these are essentially all organic. The pollution from mines is almost entirely of a mineral character, in suspension, and the amount of this mineral matter is sometimes so great, as in the Red River, in Cornwall, that to represent the pollution from mining refuse, and the drainage from tin mines in this river, we should really require to carry the line representing mineral matter on the diagram 140 feet, or nearly to the other side of Albemarle Street. There the ore and matrixes are crushed together into an impalpable powder on the mine, and then washed with water to separate the heavier metallic matter from the rocky matter. The effluent water from the settling-pits is very muddy, often containing poisonous matters in suspension. Especially is this the case in lead mines, where a considerable quantity of galena and carbonate of lead are carried down the streams, and are washed on the adjacent land where cattle are grazed. The captains of mines are often totally ignorant of the large quantity of valuable material thus lost. Nearly 7 tons of lead ore in 100 tons of waste stuff are thus thrown away at a mine in Northumberland, and in the Welsh mining districts there are similar examples of waste. These metalliferous scampings extend many miles down stream, and destroy the lives of cattle and poultry. Such is the pitiable plight to which many of our formerly beautiful rivers have been reduced, and now the question confronts us—what are the remedies?

Fortunately science gives no uncertain reply to this question. The deposit of solid rubbish into the streams as practised in many places does not even require the aid of science—common sense itself supplies the answer. Such rubbish is intentionally and often laboriously taken to bank, and shot into the stream; its prohibition under adequate penalties needs only to be enforced.

I must, however, confine myself to the chief sources of river pollution—viz., first, its pollution by town drainage and fibre manufacture; and, secondly, its pollution by mining operations or mineral works. These are essentially different in their character, and require distinct remedial measures.

Before proceeding to investigate the various remedies which have been proposed for the first species of pollution, it is necessary to be quite sure that artificial remedies are necessary, and that nature does not herself perform all that is requisite for the purification of streams. It has been long a theory that polluted rivers cleanse themselves, and that if you pour into them foul organic matters, they are rapidly destroyed, and, after a flow of 12 miles, rivers purge themselves from the stain, and regain their pristine purity—an exceedingly comfortable doctrine, if true. This theory is in great repute among two classes of persons—first, all those who are polluters of rivers; and, secondly, amongst water companies who abstract their beverage from points below the outfalls of town sewage. Now, considering that this was an exceedingly important question, we submitted it to very close investigation in our laboratory, and the results we have obtained are embodied in the diagram before you.

We experimented, in the first place, upon the Irwell below Manchester, and the Mersey below Stockport, and the Darwen below Blackburn. We took samples of the water at particular points of the river, and then at other points lower down, after a flow of a considerable number of miles, and before any other polluting matters had entered the stream. Thus, we took the Irwell below Manchester, and then 11 miles further down, and there were three experiments recorded here. You will see that while there is a reduction of organic matter in suspension, there is practically no diminution of the quantity in solution. The organic matter in solution is comparatively unaffected, certainly not destroyed, although the river falls over nine weirs, and is thoroughly aërated. This table of experiments shows that the quantity of organic matter in solution is almost exactly the same at the end of the flow as at the beginning. In another there is actually slightly more organic matter after the flow than at the beginning. This is owing to some accidental interference with the normal composition of the river between the points where the samples were taken. The samples were taken as nearly as possible at times corresponding with those necessary for the flow between the two points.

The same results substantially were obtained in the Mersey, where there was a 13-mile flow available; and also on the Darwen, where there was a 13-mile flow. You will see that the organic matter in these cases is quite unaffected by the flow.

But it might be said that, in the case of these rivers, the pollution is so intense that neither animal nor vegetable life can exist in them, and that it is the action of animal and vegetable organisms in the water which destroys these pollutions. We thought, therefore, it was absolutely necessary to repeat these experiments upon a river water in which the pollution was much milder, and for this purpose we selected the Thames. It does not, however, afford quite so good an opportunity of judging, as we could only get a flow of four miles. We took first a sample of the Thames below Reading, after it is joined by the Kennet, and where it is badly polluted by the drainage of Reading. We allowed sufficient time for the river water to flow down to a point four miles lower, and between these points no fresh polluting matter comes in. After this flow, as you will see, the quantity of organic matter in solution is almost exactly the same. The quantity of mineral matter in suspension has become considerably reduced, but the quantity of organic matter in suspension is just the same at the end as at the beginning. These results, therefore, though the experiments were made in May, when aquatic vegetable and animal life is peculiarly vigorous, led us to the same conclusion as the experiments on more polluted rivers.

We must, therefore, abandon this theory of the self-purification of rivers, and address ourselves to artificial remedies, and obviously not depend upon nature for the purification of our streams.

The methods which have been proposed for remedying organic pollution may be conveniently divided into—first, methods of precipitation; and, secondly, methods of oxidation. There has been much talk of late about the best means of promoting original investigation, and various suggestions have been made. There is, however, a stimulant to original research not hitherto generally recognized, but which, in the case of river pollution, was found to be very effective, and this stimulus was an injunction in Chancery. It is wonderful, under this stimulating influence, how people bestir themselves, and find out methods of diminishing, if not of removing entirely, the polluting matter which they had been previously discharging into the rivers, under the impression that it could not be purified.

Amongst these methods of purification the methods of precipitation have been most talked about, because they are the most easily applied on a small scale, and are therefore easier subjects for experiment. We have here an illustration of this method of precipitation. I will add to a solution of bicarbonate of lime, which is almost invariably present in these polluted waters, and especially when the pollution arises from town drainage, some perfectly clear lime water. [Experiment performed.] You see, as soon as these two perfectly clear liquids are mixed together, there is a dense turbidity produced; there is a precipitation of white matter, which white matter is chalk. Now, if there is anything suspended in the water when this precipitation takes place, the chalk lays hold of it, and carries it down with its own particles. But it does more; it acts by surface attraction, and actually takes out of solution some of the organic matter which was really dissolved in the water. We can convince ourselves of this by an experiment on this water tinted by black dye. I will add some lime water to it, and I think you will find that when this is well shaken, and then allowed to stand, the deposit that goes down will carry the whole of the colouring matter out of the tinted water. [Experiment performed.] The effect is one of pure surface attraction. We can imitate it by pouring this coloured liquid through a skein of Berlin wool, which I have here in a tube. [Experiment performed.] Here you see the coloured liquid is passing down the tube, and it will issue presently into the glass below in a colourless condition. Here is another tube with fragments of common chalk in it; we will pour some of this liquid through it, and ascertain the effect of the chalk upon it. [Experiment performed.] Now, you see in the former experiment that the highly-tinted water came through perfectly colourless, leaving the first few inches of the Berlin wool reddened; and you see the chalk has performed exactly the same office.

This is the secret of the purification, such as it is, which is effected by all these different processes of precipitation, of which there are several examples on the table. Here, for instance, is sulphate of alumina added to town drainage, and you will see that whereas the original drainage was very foul, here a large quantity of matter has been precipitated out of it. Here again is a mixture, technically known as the A. B. C., a mixture of alum, clay, and blood in an infinitesimal quantity. What the blood does in the mixture, no one yet has been able to give a satisfactory account. You will see that we get a comparatively clear liquid, with most of the solid matter at the bottom. Here is milk of lime, the same kind of thing we had in the experiment we first performed. Here, again, we get a clarification which is very nearly equal to that obtained in the other cases. Here is a similar experiment with a mixture of lime and superphosphate of alumina, and here again lime and clay, and here lime and perchloride of iron.

But if you look at the results, as recorded in the centre diagram, you will find that this amelioration, as in the case of lime, is chiefly an amelioration with reference to suspended matter, which is enormously diminished. In that way they are useful; but they still leave in the liquid such an amount of polluting matter as to prevent its discharge into streams without fouling them very much. In fact, some of the foulest streams we have seen were rivers into which town sewage, treated with these mixtures, had been discharged. In all these cases it is simply surface attraction which acts in removing the solid matters suspended in the liquid, and also a small quantity of the soluble polluting matter. But the amount of surface (so to speak) is in all these cases far too small. You will require to use an enormous quantity of these matters to effect a satisfactory result. These systems have originated from two erroneous suppositions. First, that the foul matter in drainage can be removed by chemical means; and, secondly, that the matter so thrown down is valuable as manure. But in every case where tried the precipitated matter is not worth the carriage for more than a mile or two, so that it is practically worthless. In fact, the manuring constituent of this foul drainage is left almost intact in the solution.

The great lesson taught, however, by all these nearly abortive attempts is that surface attraction is capable of effecting that which, by chemical affinity, it is impossible to achieve. These are not cases of chemical affinity. There is no fixed relation between the matter precipitated and the precipitant. They are pure cases of surface attraction, but vast quantities of the purifying ingredients would be required to make them really efficient. This would involve great expense, which would render the process impracticable. It would also convert the drainage water into mud, and produce a quagmire almost impossible to get rid of.

The purifying material in each case is manufactured at great cost, and is laboriously carried to the sewage and fished out again at great expense, so that these processes failed in almost every case in getting a profit. That would not matter much; people must be prepared to pay something for cleansing these foul liquids. But the foul liquids are not cleansed. These materials are almost always alumina, carbonate of lime, &c., existing naturally in almost all porous soils, and the drainage water which has to be purified will flow to them by gravitation. You have these materials, therefore, in the natural soil. These materials are capable of removing nearly the whole of the polluting matter brought in contact with them. We are, therefore, thus led by pure scientific induction to the purification of these waters by the process of irrigation. Foul drainage is thus mixed with a vast quantity of soil which, by surface attraction, removes from it polluting matter both in suspension and in solution. It also removes the fertilizing matter to a great extent, and the roots of plants ramifying through the soil gather it up, so as to prevent the pores becoming clogged, and therefore useless for the purposes of purification.

The results affirm the theory. From the diagram you see "Town drainage before the process," and you see the great reduction of polluting matter both in suspension and solution. Here is the foul water, and here is the effluent water from the irrigated meadows at Croydon. When the raw material used in irrigation and the effluent water are submitted to analysis, you see at once that the foul drainage is very efficiently purified.

The water which flows out has only this small amount of matter in solution, and a small quantity in suspension. This is the result attending irrigation. The most sterile soil becomes converted, by treatment with this foul liquid, into fertile meadows. No one visiting Aldershot can fail to be struck with the emerald tint of the irrigated land, contrasting as it does with the sterile soil around it. Every variety of crop can be grown, and at the Barking farm, you can actually see, in the summer season, the drainage of London transformed into strawberries and cream.

For the purpose of irrigation, one acre of land is requisite for every 100 persons contributing to the drainage, and when properly conducted there is no nuisance. The only drawback to irrigation is the difficulty, and sometimes the impossibility, of obtaining sufficient land suitable for carrying on the process near large towns. This led us to experiment upon the possibility of making a given area of land do more work. After a continuous application of sewage, the pores of the soil are soon clogged up. We therefore availed ourselves of the well-known property of porous substances first discovered in platinum by Faraday—its attraction for gaseous matter, especially for oxygen. Platinum possesses it to a high degree, and it was upon this metal that Faraday chiefly experimented. Here is a mass of platinum in a porous or spongy condition, and I will apply to it a jet of hydrogen, which, as you see, immediately bursts into flame. If we substitute a jet of coal gas, you see the same result produced. The pores of the platinum continually attract oxygen into them, and that oxygen is in an extremely active condition, so that it is capable of burning the coal gas passing over it. There is also here [exhibited] a material which Sir Charles Wheatstone directed my attention to some time ago, which contains oxygen also in a highly active form. It is a mixture of permanganate of potash and sulphuric acid. The oxygen supplied by this mixture is sufficient to oxydize organic matter, even in solution in water. When water mixed with tartaric acid comes in contact with the mixture, the organic matter is immediately burned up. Here is a jet of coal gas; you see it is almost immediately ignited when brought into contact with this oxygen in its very active condition.

We were sanguine enough to hope that this property might be present to a sufficient extent in porous earth, though not to the same extent, causing the slow but complete combustion of foul matter. And here expectation has not been disappointed. Here is a sample of the drainage of Merthyr Tydvil, and here is the effluent water when passed through porous earth after being subjected to atmospheric action in the process of intermittent filtration. This water is purer than the water we drink in London.

This process is equally applicable to the discharges from fibre factories of various kinds. [Samples exhibited of effluent water after intermittent filtration.]

Now by this process, as it has been carried out for three years at Merthyr Tydvil, the drainage from 3000 people can be cleansed upon a single acre of land. Crops may also be grown upon the land. We believe, as the result of our inquiries into these remedies for organic pollution, that the sewage purification of the future will be irrigation, but that for the present the system of intermittent filtration is safer as regards expense. Neither process is any nuisance to the surrounding neighbourhood. The carrying on of a sewage farm by corporations or local boards is a thing not likely to pay or not likely to be carried on economically—amateur farming rarely does—and this cannot be even so likely in the case of corporations. So that by this process of intermittent filtration, the original expense of doing this is much smaller as regards the quantity of land required. In the one case 30 acres are required for 3000 people, in the other only one acre for the same number.

For mining pollution the remedy is exceedingly simple—viz., subsidence in properly constructed tanks for six hours. The result, though not in every case quite satisfactory, is sufficient to show that the vast amount of mining pollution in many of our rivers would be substantially abolished. Even in the case of drainage from coal washings, the pollution, after subsidence, was reduced to this small amount shown in the diagram.

These plans would be sufficiently effective for the treatment of all kinds of mining drainage. But it is quite necessary, in any legislative enactment to secure the better treatment of rivers, that there should be some definition of polluting matter. We gave great attention to this point, and have, prepared, after great deliberation, the following standards of purity:—

Standards of Purity.

The following liquids should be deemed polluting, and inadmissible into any stream:—

(*a*) Any liquid which has not been subjected to perfect rest in subsidence ponds of sufficient size, for a period of at least six hours, or which, having been so subjected to subsidence, contains in suspension more than one part by weight of dry organic matter in 100,000 parts by weight of the liquid; or which, not having been so subjected to subsidence, contains in suspension more than three parts by weight of dry mineral matter, or one part by weight of any dry organic matter in 100,000 parts by weight of the liquid.

(*b*) Any liquid containing, in solution, more than two parts by weight of organic carbon, or ·3 part by weight of organic nitrogen in 100,000 parts by weight.

(*c*) Any liquid which shall exhibit by daylight a distinct colour when a stratum of it one inch deep is placed in a white porcelain or earthenware vessel.

(*d*) Any liquid which contains, in solution, in 100,000 parts by weight, more than two parts by weight of any metal, except calcium, magnesium, potassium, and sodium.

(*e*) Any liquid which, in 100,000 parts by weight, contains, whether in solution or suspension, in chemical combination or otherwise, more than ·05 part by weight of metallic arsenic.

(*f*) Any liquid which, after acidification with sulphuric acid, contains, in 100,000 parts by weight, more than one part by weight of free chlorine.

(*g*) Any liquid which contains, in 100,000 parts by weight, more than one part by weight of sulphur, in the condition either of sulphuretted hydrogen or of a soluble sulphuret.

(*h*) Any liquid possessing an acidity greater than that which is produced by adding two parts by weight of real muriatic acid to 1000 parts by weight of distilled water.

(*i*) Any liquid possessing an alkalinity greater than that produced by adding one part by weight of dry caustic soda to 1000 parts by weight of distilled water.

(*k*) Any liquid exhibiting a film of petroleum or hydrocarbon oil upon its surface, or containing, in suspension, in 100,000 parts, more than ·05 part of such oil.

In any enactment for the correction of river pollution, the above standards may be safely qualified by the following proviso:—Provided always, that no effluent water shall be deemed polluting if it be not more contaminated with any of the above-named polluting ingredients than the stream or river into which it is discharged.

Of these standards the first two are by far the most important—the standards referring to suspended matter and to the quantity of organic carbon and organic nitrogen which ought to be allowed to be transferred into streams. These supremely important standards, if enforced by proper and judicious enactments, giving sufficient time for manufacturers to carry out improvements necessary for the purification of their foul drainages, would, we believe, abolish fully nine-tenths of all the river pollution by which our streams are now affected in Great Britain. But without the enforcing of the first two standards, this gigantic and growing evil, which is becoming greater and greater every year, will not, I believe, be seriously and perceptibly lessened by any other method of enforcing purification.

Investigations of these two conditions, extending over nearly ten years, show that in the first place the rivers of Great Britain are to a great extent indeed fouled and destroyed, not only for domestic, but also for manufacturing purposes, so that the extent of our manufactures is limited by these means, and no people complain more loudly of this pollution than the manufacturers themselves, and none are more ready to adopt judicious measures for removing it. Various manufacturers have spoken of the value of the streams for them, if purified to the extent we have specified, some of them going to the extent of £1000 a year. I think, on the one hand, while establishing this gross abuse of rivers, where manufactures and mines are carried on, there is, on the other hand, very good reason to believe that a comparatively mild form of legislation, if firmly enforced, would have the effect of restoring many of these rivers to nearly their original purity. To make them pure for drinking purposes is, perhaps, impossible; but we may reasonably hope that they may become sufficiently so to delight the eye, and to repress the pestiferous and sickening exhalations which at present affect multitudes of our population compelled to pass their lives on the banks of such rivers.

BIRKENHEAD GAS SUPPLY.—At the monthly meeting of the Birkenhead Commissioners on the 2nd inst., Mr. Henderson, in moving the confirmation of the proceedings of the Gas and Water Committee, referred to the price of gas, and said no decrease could at present be made. Of the increase of 6d. per 1000 feet, which was made a year or two ago, the sinking-fund absorbed 3d. on every 1000 feet, and the heavy price of coal took the remaining 3d. Mr. Worrall complained of the bad quality of the gas, and asked whether it might not be tested. Mr. Henderson replied that the gas was regularly tested. Its illuminating power was equal to 16 or 18 candles, whereas in some other places he believed it was only equal to 14 candles. The minutes were confirmed.

A REPORT ON SOME PROCESSES FOR THE PURIFICATION OF GAS.

By PROFESSOR WURTZ.

[The following are extracts from a report written two years ago, but only recently published. As the matter, however, is of great interest, and the paper contains some original suggestions, we deem it right to publish it.]

1. *The Iron Process of the New York Gas Company.*

This is founded upon a patent recently issued to Messrs. St. John and Cartwright, and consists in the use of an admixture of a native hydrated iron oxide (a common limonite ore), turnings or borings of metallic iron, and charcoal.

It would appear that this mixture is susceptible of usage without sieves or gratings, doubtless owing to the coarseness of the granulation of the material. Any advantage gained hereby, however, must be necessarily at the expense of efficiency as regards extent of absorbent surface. Indeed, the general statement is made with regard to the iron process, that "a much larger surface is requisite than with lime under equal velocities of current." (Clegg, p. 199.)

2. *The Lime Process of the Manhattan Gas Company.*

Under this head I have to describe what I cannot but view as the most valuable practical improvement in gas purification that has been made in more recent times. This improvement may be set forth as follows:—

After the purification of the gas in the ordinary "dry lime" apparatus, the foul lime, just as it remains in the purifiers, is revivified therein by the method of "ventilation" known as that of Palmer (specified in his patent of April 17, 1847, as the "using of atmospheric air to be blown through the lime purifiers before they are opened for the removal of the refuse lime"). As practised by your company, the ventilation is effected by drawing air from above downwards through the fouled purifiers; but the special and novel improvement I refer to resides in a supplementary device, which is simply the passage of the foul effluvia from the revivification through a secondary dry-lime purifier.

In the last edition of Clegg, in referring to Palmer's method (p. 188), it is remarked that "this plan of neutralizing the refuse, and thus removing the objection to the purification by lime, has not yet been sufficiently appreciated, and it is capable of being worked out with further advantage"—a judgment of the acute editors of that work which has been remarkably verified by the actual achievement of your company.

Further, in relation to this, under the next head.

Observations Made upon these Two Methods, as actually Practised by the Two Companies.

The especial object and occasion of the institution of this investigation having been to settle the highly important questions that have arisen—as to whether either, or both, or neither of these two prominent methods of purification lead, in practice, to the propagation or diffusion of noxious effluvia throughout the densely peopled neighbourhoods in which these great manufacturing establishments are located—of course nothing else could be half so conducive to the proposed result as careful examination upon the spot, in each case, of the actual working results. Such examinations were accordingly made, both at the works of the Manhattan Gas Company and of the New York Gas Company, with the care and deliberation demanded by the momentous nature of these questions.*

The absolute necessity of such renewed examination of questions which, it would seem, should have been long since settled; will appear on consideration of the opposite opinions entertained by the most recent and most esteemed authorities. Thus, compare the two following passages:—

"The sulphuret of iron, when removed from the purifiers and exposed to the air, emits no odour, whilst the sulphuret of lime is readily decomposed, and produces an abominable smell." (Last edition of Clegg, 1866, p. 187.)

"The vapours of hydrocarbons are much heavier than the atmosphere, and when evolved from the foul oxide (of iron) by the heat of chemical action, they float in the lower stratum of the atmosphere near the surface of the earth, and produce extensive annoyance. There are few smells more offensive to many persons than the smell of these compounds, given off by the oxide in the process of revivification; and in every gas-works they ought to be consumed instead of being allowed to escape. If this be not done voluntarily, the law ought to compel it." (Rev. Mr. Bowditch on Gas, 1867, p. 22.)

It is scarcely necessary to remark upon the internal evidence in these two quotations, that the former covers merely a loose and general statement, founded upon hypothetical and partial views; while the latter is circumstantial, and plainly based upon actual observation of facts. I am constrained to state that my own observation, so far as the natural capacities of my mind and senses extend, bears out the positive assertions of the Rev. Mr. Bowditch, in the latter paragraph.

I was present during a part of the time (usually extending to eight hours) occupied in the discharge of the effete material from one of the iron purifiers containing the mixture, as stated above, of iron ore, metallic iron, and charcoal; and, although the wind was very high at the time, and the effluvia were chiefly swept away at once over the East River, it was still not difficult to recognize the insufficiency of the operation.

The fouled oxide was spread out over the floor of the purifying-house in layers of a foot or more in thickness, and underwent there a sort of fermentation, or internal change, accompanied by a rapid rise of temperature of the mass. A thermometer placed in a portion of the material which had been taken out about an hour previous, rose at once to 110° Fahr., the air at the time being 82°. Hence the volatile ingredients and products were being rapidly expelled. The odours evolved were very strong, but in the immediate vicinity it was not easy to distinguish any other odours than those of naphthaline and ammonia, which overpowered all others. Remembering, however, the peculiarly persistent character of the foul odour which is complained of so greatly, and how it is observed to spread very often over large portions of the city, and to be carried by the wind for miles with but little loss of intensity, I made my observations at such a distance from the purifying-house that the naphthalic and ammoniacal smells were no longer distinct. I am obliged to say that I then caught repeatedly, and recognized beyond a doubt, the peculiar and characteristic stench with which the people of New York and vicinity are unfortunately so familiar.

The phenomenon here encountered, of the complete masking of an odour of so repulsive and nauseating a nature, by other odours, which, like those of naphthaline and ammonia, are of an agreeable nature, and highly stimulating to the nervous system (belonging, in fact, to the class of perfumes), is one that will be familiarly recognized by chemists. In fact, the art of perfumery itself is founded upon this very principle.†

When impure gas diffuses into the air, it may be asserted, from thoroughly known general chemical principles, that the odours of hydrosulphuric acid, hydrosulphates, and bisulphide of carbon must quickly be destroyed by reactions with the free oxygen or ozone) and moisture, and that of the ammonia by conversion into the inodorous solid bicarbonate. Th e naphthaline odour becomes enfeebled by dilution, so as to be imperceptible; but as regards the

* Several gentlemen, experts in these subjects, accompanied me in these examinations; but it has been deemed preferable that my own conclusions should be stated, apart from those that may have been reached by others.

† A precisely parallel case is presented in the common mode of testing samples of alcoholic liquors and spirits, by rubbing a few drops upon the skin of the hand, by which the vilest and most nauseating smells are frequently brought out, through the dissipation, by the heat of the hand, of the alcoholic odour which had masked them before.

peculiar unknown substance which diffuses itself from the fouled purifiers when opened, it seems to be susceptible of comparison only with that remarkable class of odours exemplified by the emanations from musk and from the skunk; which, so far from being rapidly enfeebled, like most smells, by aërial dilution, appear to be actually developed and intensified thereby; and to be almost indestructible by natural atmospheric agencies.

It seems likely that these troublesome substances belong to the class of impurities designated "sulphuretted substitution products," but no chemist has as yet given to the subject the attention necessary to throw any reliable light on this point.

In the examination of the modes of operation of the Manhattan Gas Company, the process was watched throughout all its stages; visits being made to the purifying-house at the beginning of the operation of cleansing out the ventilated and revivified lime; also, to there purifier, through which the effluvia are passed, at all stages of its action. The observations made were as follows:—

It was found that beyond question the method of Palmer, of effecting the revivification or "ventilation" of the effete lime in the closed and confined space of the purifier itself, causes a concentration of the heat, and a rise of temperature; by virtue of which not only is the revivification greatly accelerated, but the chemical changes occurring in the mass most beneficially modified, insomuch that the action of oxidation is much intensified, and more or less combustion is effected of the sulphuretted and other compounds, otherwise so offensive and unmanageable. Still, it would appear that this alone is not found to be sufficient; and many attempts have been made, both by the Manhattan Company and by others, to make this combustion complete, by passing the fumes produced during the ventilation through fire; but the occurrence of destructive and dangerous explosions has enforced the abandonment of this plan.

It is here that, in your modes of operation, has been brought in the new and valuable idea of continuing or repeating the process of Palmer upon the mixed air and fumes, by passing the same through a supplementary purifier charged with hydrate of lime. Examination showed that in this secondary apparatus an important rise of temperature occurs also, accompanied by powerful chemical action, indicated by an abundant evolution of vapours of phenol or "carbolic acid," with naphthaline and ammonia, and an entire disappearance of the peculiar and persistent stench which has been the cause of complaint, so that at a little distance on the lee side of the supplementary purifying chamber, or of the effete mass after removal therefrom, the only perceptible odour was of a phenolic character.

It is true that the delicate test, lead paper, still answers, in the air of this chamber, to a trace of sulphur; but it has been shown by the Rev. Mr. Bowditch ("On Coal Gas," London, 1867) that there are sulphur compounds which may exist in gas in traces, and which are capable of staining lead paper, and which, nevertheless, are not susceptible of absorption by lime and other substances possessed of the strongest affinities for sulphur in most forms (peroxide of iron being particularly mentioned).

There is no disputing the fact, of which the evidence is rapidly accumulating, that the tendency of progress founded upon the teachings of experience, among gas managers, is in the direction of a return to the use of lime for purification; unless some great and indisputable improvement shall be introduced, increasing greatly the efficiency of the iron process.

The recent literature of gas could be largely quoted in support of this assertion. In fact, the only advantage of the iron process, and the one which led to its adoption, in most cases where adopted, was no conviction of superiority of any kind over lime; but a matter of mere convenience, being solely the incidental circumstance, in the case of large urban gas-works, of the difficulty of getting rid, in cities, of so large a mass of the fouled lime; and inasmuch as it was found that the iron oxide could be revivified and used over and over again many times, this difficulty did not apply to so great an extent, at least to the iron process.

Bowditch, commenting on this, says (p. 29):

"Some engineers in towns, especially in London, are frightened at the thought of having to remove lime which has purified gas. Their fears arise from experience relative to ordinary gas lime, which evolves most offensive compounds on exposure to the atmosphere."

It is obvious that all such fears have no longer any real foundation in view of your perfected mode of deodorizing the fouled lime, and depriving it of all offensive matters.

It has been held that the panacea for all the ills of the iron process consists in the addition of a lime purifier thereto. The report of Messrs. Torrey and Schultz, however, which is quoted above, shows that the absorption of illuminating ingredients by such second purifier, and the impoverishment of the gas, would more than neutralize any possible benefit.

Bowditch favours another plan. He says (p. 21):

"The evolution of the sickening vapours emitted by foul oxide (of iron) need not be a source of annoyance, as the oxide can be revivified in the purifiers themselves," &c.

This does not seem to promise benefit, unless, indeed, the additional device of your company were used here also, and the effluvia from the revivification in this way of iron oxide in the purifiers themselves, were deodorized again by a lime purifier. Bowditch himself, seeing the difficulty, proposes to burn these effluvia; but here the danger of explosion steps in again. Besides this danger, revivification of foul iron in the purifiers seems likely to be impossible from another cause—namely, that if the revivifying iron sometimes becomes red hot in the open air, as is well known, the heat engendered in the closed purifier would, without doubt, accumulate so as to become wholly unmanageable, and sulphurous acid gas would surely be generated in quantities; thus, what is now possibly but a nuisance, and not certainly known to be deleterious, would be converted into a recognized poison.

Discussion of the interesting modifications that have been proposed by Laming, Graham, and others, would lengthen this report too much, and the more especially as the practical and inevitable conclusion from the whole investigation and discussion is that the Manhattan Gas Company could scarcely do better than now, so far as the questions apply, of efficient purification, and avoidance of production of nuisances thereby.

It has been suggested that even the residual odours of ammonia, naphthaline, and phenol, and the traces of sulphur found on the final issue of the fumes from the secondary purifier or deodorizer, might be removed by placing a small scrubber or condenser at the tail of the whole apparatus. The estimation in which phenol is now held, however, as an actual disinfectant, might suggest some hesitation in thus preventing its final escape into the atmosphere of our filth-infested metropolis.

Closing Suggestions.

I have to suggest that, in my view, it might be regarded by some as desirable, in order to complete the case, and fully to demonstrate the position taken by the Manhattan Gas Company—

To institute a thorough chemical investigation of the changes and metamorphoses that take place, and the products that form, in the processes of ventilation and deodorization; thus establishing the theory of the new improvement.

To endeavour to find some mode of preventing or mitigating the nuisance, which would appear to proceed indirectly from the gas, through the sulphate of ammonia manufacture. This might probably be accomplished with ease, by the application of some chemical and practical skill.

MANCHESTER DISTRICT ASSOCIATION OF GAS ENGINEERS.

The Twenty-First Quarterly and Fifth Annual Meeting of the Members of this Association was held at the Mitre Hotel, Manchester, on Saturday, Feb. 27. The chair was occupied by the PRESIDENT, Mr. Longworth, Assoc. Inst. C.E. Dukinfield.

The following report was read:—

"Your committee, in presenting their fifth annual report, have again to congratulate you on the continued prosperity of the association.

"During the year it is gratifying to state that eleven new members have been elected, and, none withdrawing, the roll now contains the names of 55, all of whom are *bonâ fide* gas engineers or managers.

"Three papers have been read before the association during the year, by the following gentlemen:—

"Mr. Rafferty, of Manchester, on 'An Improved Apparatus for Connecting Services to Mains.'

"Mr. Veevers, of Bolton, on 'Gasholder-Tanks without Puddle;' and

"Mr. Longworth, of Dukinfield, on 'Gasholder-Tanks with Puddle.'

"The discussion on each paper has been interesting, instructive, and on the whole lengthy, as it is a feature at the associations meetings to require each member present to take a part in the discussion.

"In the course of the year it was decided to publish papers of especial value, subject to receiving the consent of the writers. The effect of this resolution so far is, that one paper has been issued and two others are adopted for publication. It follows from this that the expenses of the association will be proportionally increased; but, by reference to the statement of accounts herewith presented, it will be seen that for some time to come the ordinary income will suffice.

"At the May meeting the members had an opportunity of testifying their appreciation of the willing and efficient manner in which Mr. Longworth promoted the interests of the association, in the capacity of honorary secretary, from the time of its formation to his retirement from that office. The testimonial consisted of a valuable illuminated address in frame, and a pair of inkstands with engraved inscription.

"At the same meeting the members paid a visit of inspection to the chemical works of Messrs. Bouck and Co., Limited, at Miles Platting, through whose generosity they were afterwards most hospitably entertained.

"In July the committee issued a series of about 20 questions on retort-settings to the members. Replies from 32 were received and put in print for issue to those who had contributed, and by this means they obtained a fund of information not otherwise so easily accessible.

"In conclusion, the committee tender their thanks to those members who have so materially contributed to the success of the meetings by the production of papers of such practical interest. They earnestly desire the members to continue to manifest their interest in the association by a regular attendance at the quarterly meeting, and a willingness to contribute information in the form of papers, according to their respective abilities."

Mr. SAMUEL HUNTER, of Rochdale, was then unanimously elected president of the association for the ensuing year, and on taking the chair he spoke as follows:—

Gentlemen, I thank you for the honour conferred in electing me to the position of your president—an honour that was unsought and unexpected on my part; but, as you are evidently unanimous in your wish, I cannot decline. I am conscious of the fact that I have to follow gentlemen who have displayed a peculiar fitness for this post, and who have discharged the duties of their position with credit to themselves, and to the benefit of the association. It has always appeared to me that, on election, the president should be prepared with a review of the preceding year in regard to this association, and also prepared with something in the shape of an inaugural address, in which he might give members a retrospect of what has been accomplished or attempted in the gas world at large, and give his idea, or simply name, or review, any recent invention of importance to gas manufacturers or proprietors. Under existing arrangements, it is simply impossible for the newly-elected president to give such an address. My case is an illustration of the same difficulty that my predecessors have been placed in. It is only a few days ago since I had the slightest intimation that you desired me to assume such a position; and as it was not until the present moment that my election became a certainty, you will readily understand the impossibility of me doing justice to the subjects, or the association, or myself, in attempting anything of the sort. There have been questions agitating the public and the financial world, of deep interest to ourselves, which we have never discussed here, and which are not likely to be brought before you in any other way. In regard to these, and other matters more fully connected with the manufacture of gas, I should have been very glad to have said more about them this afternoon, had you been able to give me the time. There are other gentlemen now present with communications according to our programme, who have been disappointed at previous meetings; and if I occupy much more of your time, I shall only be doing them an injustice. I may say that the committee, anticipating my difficulty, and with a view of preventing a recurrence of the same, have decided to submit to you a motion this afternoon for altering the rules, so that in the future the president may be elected at our November meeting, and thereby have three months for preparation before our annual gathering in February.

In regard to this association, the report of the committee has just been read to you; it is so full as to scarcely require any comment from me. It is gratifying to find that the association is in a most flourishing condition, both as to finances and membership. It has now become an institution of considerable importance to gas engineers; I might venture to say second only in importance to the British Association of Gas Managers; and, in some of its arrangements, I think superior even to that. It must be borne in mind that our district is one of the most densely populated in the world, and the managers or gas engineers enrolled on our lists have charge of—taken as a whole—some of the most important and largest of gas undertakings. We admit within our ranks none but *bonâ fide* engineers or managers having actual control of gas-works. Considering we are so choice in our selection, it is exceedingly gratifying to find, at the close of another year, that every one of the 44 old members has stood firm and true; and, in addition, we have 11 new, making a total of 55 members. The main object that we have in view in associating together is, undoubtedly, that we may thereby increase our knowledge of the business or profession in which we are directly engaged; and I will venture to say that a moderately informed man, regular in his attendance at our gatherings, will meet with what I may call help, or benefit, by his intercourse with other members similarly situated, to such an extent that in a very short time he will—in his stock of information—be ahead of the easy-chair engineer or manager so exalted in his idea of his own resources as to deem such intercourse unnecessary. During the past year the papers have not been numerous, but they have been of a high order of the right stamp; and I speak the feeling of each member when I say that the gentlemen who have taken such pains in their preparation deserve our best thanks in something more than a formal manner. There is a value to be attached to these meetings beyond the formal reading of a paper, or any discussion arising therefrom. I refer to the kindly feeling that is generated between one another. Instead of being strangers, we are brothers; and only those who live in densely populated districts know the value of creating and keeping up a friendly feeling between managers whose interests are so identical, and whose districts, in so many instances, are only divided by imaginary lines. Our first object is to diffuse amongst each other and discuss what I may call "gas ideas;" and next in importance I must consider the advantages of

opportunities these meetings give to the members of indulging in those little pleasantries—if I may coin a word—and creating and keeping up that friendliness that makes us so much the better neighbours, and our course in life so much smoother.

There is another point—there is no disputing our attachment to the British Association of Gas Managers; we all wish that association success. It has often struck me that at some future time we shall become more closely allied, and acting as an auxiliary, or the two associations together, we may act more directly for each other's good. For my own part I think the British Association of Gas Managers ought to make it a point to encourage the formation of branches in various parts of the provinces, and by such auxiliaries having direct representation at the central board, the value and importance of the leading association would be increased.

Gentlemen, though I have not had the opportunity of delivering to you a formal address, if agreeable to you, and circumstances favour me, I shall be glad, on another occasion, to engage your attention; other gentlemen, by arrangement, claim this afternoon. I heartily compliment you upon the success during the past year of the Manchester District Association of Gas Engineers, and thank you for electing me to the honourable position of your president; trusting, with your help, that I may, by following the steps of my predecessors, contribute to and witness as successful a year as any in the past.

The following are the officers for 1875:—

President—Mr. Samuel Hunter, gas engineer, Rochdale.

Treasurer—Mr. James Paterson, gas engineer, Warrington.

Hon. Sec.—Mr. James Braddock, gas engineer, Droylsden.

Committee—Mr. James Jacques, gas engineer, Stockport; Mr. W. T. Roberts, gas engineer, Altrincham; Mr. Harrison Veevers, gas engineer, Bolton; Mr. John Hutchinson, gas engineer, Barnsley; Mr. William Longworth, gas engineer, Dukinfield; Mr. William Blackledge, gas engineer, Bacup.

Auditors—Mr. William Smith, jun., gas engineer, Hyde, and Mr. John Cockcroft, gas engineer, Littleborough.

DIRECTIONS FOR AMATEUR GAS TESTERS.

A correspondent of the *West Briton*, writing on the gas supply of Truro, says:

"Let me ask your readers to become, for the time, amateur analysts of coal gas. It will not require very much brain power to carry out the following experiments, when each gas consumer can verify for himself that the assertions I am about to make are *facts*—not theories, as has been stated. Procure, then, three small medicine bottles, and number them 1, 2, and 3, and also procure from any chemist a bit of sulphate of iron (green vitriol), a bit of acetate of lead (sugar of lead), a bit of turmeric paper, and shake up for yourselves a bit of quick-lime, in half a pint of cold water, and let is stand till the water becomes quite clear. Next, procure a bit of india-rubber tubing—if nothing else can be obtained, rob the baby's feeding-bottle—and slip one end of the tubing over the gas-burner, letting the other end hang down. Next, take some fresh rain water (not such as would come from the proposed water-works, as you might, perchance, find mundic in it), fill your bottle No. 1 about two-thirds full, and in it dissolve your little bit of sulphate of iron. In like manner fill bottle No. 2, and add your acetate of lead; in No. 3 pour off the clear portion of your lime water; and, lastly, if you have a spare gas-burner (Argand with a chimney is best) hang, by a bit of cotton, in the chimney or over the burner, your turmeric paper, not wet, but fairly damped. Take your bottles in succession, and let the tubing dip about half an inch under the surface of the liquid in each case, and turn on the gas. Mind, don't light the gas, or you might perform one of our town councillor's proposed experiments, but, of course, on a small scale; turn on the gas to the turmeric paper as well, and wait a few minutes. What is the result after subjecting each bottle in turn to this test? Bottle No. 1 turns as blue as—what? Probably as blue as a gas manager would on his reading this letter—that is, if he were guilty. Bottle No. 2 will turn as black as the looks of the said gas manager if he only saw me now writing this letter. Bottle No. 3 will turn as white as ony one might be supposed to do who had escaped being blown up by pumping air into a gas-retort, whilst the turmeric paper would turn as red as myself if ever I should be hanged for writing this letter.

"But what does this blue, black, white, and red mean?

"It means, gas consumers, that, by the blue indication, your houses are being contaminated with the fumes of cyanogen (the base of prussic acid), one of the deadliest poisons known; by the black, they are being contaminated with sulphuretted hydrogen (the essence of rotten eggs); by the white, they are permeated with carbonic acid (the gas that killed the poor wretches in the "Black Hole" of Calcutta); and by the red, you are inhaling ammonia vapours—the miasma of your cesspit; but—and the evil is not yet all out—in the burning of the sulphuretted hydrogen, sulphuric acid or oil of vitriol vapour is generated, to float about the rooms of your house, to attack all and everything it comes near, though in such an insidious form that its presence is not suspected.

"To further continue my catalogue of evils, I may mention that for every 1 per cent. of carbonic acid in the coal gas the light is reduced 10 per cent.; that 1-50,000th part, or 3½ cubic inches, of free ammonia in 100 cubic feet of coal gas is directly prejudicial to health; and as for the cyanogen, its effects are too well known by all persons to need my giving them in detail.

"See the evil effects in our drapers shops—the colours of their delicate goods destroyed, especially mauves and magentas, in their various shades of colour. See the blackening of the goods in the jewellers shops; the fading of the fancy patterns in the carpets, chairs, cushions, wall papers, &c., in your drawing-rooms, and which fading good Mrs. So-and-So attributes to the sunlight, and so, to keep them good, pulls down the blinds and keeps the house in semi-darkness."

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

The majority of the foundries continue to be pretty fairly engaged on the conditions which have been referred to in these notes several times within the past month or so.

Pig iron has again been in moderately good demand during the week, at the prices then current, with but slight deviations, as recorded in the following list:—No. 1 foundry, 64s.; No. 2 foundry, 61s. 6d.; No. 3 foundry, 59s.; No. 4 foundry, 57s.; No. 4 forge, grey, 56s.; No. 5 forge, mottled, 55s.; No. 6 forge, white, 53s. 6d.; refined metal, 76s.; Kentledge, 63s.; and cinder pig, 44s., all per ton on net cash terms.

Most of the blast-furnaces at Sheffield, Rotherham, Parkgate, Elsecar, Sheepbridge, and Staveley, are being run to about half or three-fourths of their producing powers. At one or two establishments full time is being made, the pig being wanted for working upon the premises. At the Milton and Elsecar Ironworks a reduction in wages of 15 per cent. has been made in several departments. This reduction is also likely to be enforced at several other works in the district.

The stove-grate establishments are still doing a very fair amount of business, partly on account of the home and partly for the Australian and certain continental markets. Messrs. Guest and Chrimes, of Rotherham, are producing their usual large turn-out of brass foundry, plumbers fittings, and general descriptions of water-works requisites. The price of fuel continues to grow weaker, a further recession to the extent of 6d. to 1s. per ton having again to be put on record this week. Steam coal is, however, pretty firm in price, several good locomotive contracts having just been placed locally on account of leading railway companies. Shipments from Goole, Grimsby, and Hull are yet fairly large, but will not be up to the full average until the Baltic navigation is again in operation. This, at present, appears unlikely, the Sound being almost entirely frozen over.

The anticipated reduction in the wages of the South Yorkshire and North Derbyshire miners is at length beginning to be spoken of as a fact, and steps will be taken within the next few days which will put the question in a tangible form before the men. The owners are now much more compactly united than on any previous occasion, their newly-formed association having a capital of £100,000, with power to make further calls. A request has been conveyed to the secretaries of the men's association, asking them to consider the desirability of submitting to a reduction in wages. This will be deliberated upon forthwith. The associated miners number 25,000 men, and have a capital of about £50,000. The amount of the reduction has not yet transpired, but will probably be 15 per cent.

IRON AND COAL TRADES OF SOUTH STAFFORDSHIRE AND EAST WORCESTERSHIRE.

(FROM OUR OWN CORRESPONDENT.)

There is no improvement to report in the condition of the iron trade of this district. Orders are growing increasingly scarce, and manufacturers now experience considerable difficulty in keeping their works in operation. It is quite evident that a substantial reduction in prices must be made to restore anything like a steady demand. At present there is not much giving way in prices; the standard of £10 10s. to £11 per ton for marked bars is pretty generally maintained, though the current inquiries are for the commoner qualities of iron, which are quoted £8 17s. 6d. per ton for bars, and £12 for sheets. Sheets, hoops, and plates continue the leading features of request.

In pig iron the aspect of business is much the same. The continued high price of fuel, and the great scarcity of native ores, combined with the competition of other districts, which is increasing in severity, will prevent for some time to come the relighting of many of the furnaces which are at present standing idle. It is computed that 18 blast-furnaces in the South Staffordshire and East Worcestershire district have been completely demolished during the past 10 years in consequence of the contiguous mines having been worked out.

The ironfounders are well under order for machine castings, gas and water mains, and other leading descriptions of the heavier class of produce.

At Wednesbury the general tone of business is unaltered, and there seems no prospect of an early adjustment of the labour difficulty in the tube trade; indeed, judging from the various meetings of the operatives which have been held during the past week their organization is growing in strengh; £264 has again been distributed amongst the men on strike, which is a marked increase on the last allowance, and the men seem determined to continue the struggle, and express themselves confident of ultimate success, while the cry of manufacturers in all the heavier branches of local industry is for cheaper production, to enable them to compete more successfully with foreign rivals.

The coal trade is inactive, the recent severe weather has somewhat stimulated the demand for the better class of household qualities, but manufacturing fuel is weaker, with a declining demand. On the Dudley side of the district the prices of thick coal are nominally unchanged, but sales are now effected with difficulty, and a reduction at no distant date is generally anticipated. Coke is again weaker, and very slow of sale.

THE COAL AND IRON TRADES OF LANCASHIRE.

(FROM OUR OWN CORRESPONDENT.)

In the Manchester market the coal trade continues very steady in all the better classes of coal, which remain firm in price. For house coal there is still a very brisk inquiry, which is in excess of supplies. Furnace coal is in very good demand, and also scarce. Good burgy and slack are not at all difficult to sell, but common descriptions are dull, slack especially meeting with a very slow sale, and concessions in prices have in consequence been necessary. The average pit prices in the district are as under:—Best coal, 14s. to 15s. per ton; common coal, 12s. to 13s.; inferior, 10s. 6d. to 12s.; furnace coal, about 10s.; best burgy, 7s. 6d. to 8s.; common, about 7s.; best slack, 5s. 6d. to 6s.; common, almost any price under 5s. 6d. For gas coal and cannel there is a very fair inquiry at about late rates.

In the principal coal-producing districts best coal continues firm, but engine fuel and slack are in less demand, and rather easier in price.

The shipping trade is dull, foreign shipments being very quiet, and there is a downward tendency in the market, common coal being offered at Liverpool at very low prices.

In coke a moderate trade is being done, the supply and demand being about equal. There are a great many inquiries in the market, but many of them are not for business.

The report of the committee appointed to inquire into the manner in which the railway coal traffic of this district has of late been conducted was submitted to the South Lancashire and Cheshire Coalowners Association at the usual meeting on Tuesday. The report is a very strong one, and complains that both the London and North-Western and Lancashire and Yorkshire Railway Companies are short of locomotive power and men, whilst the traffic arrangements, in many cases, are bad; the result having been that collieries have been either altogether stopped, or compelled to stock coal through the delays in removing loaded waggons and returning empties; such delays having, in some cases, extended from one week to more than four weeks. The effect of this to the coal trade has been most serious, and the committee report that the losses to coal proprietors are great and continuous. It was resolved that a memorial embodying the above facts should be presented to each of the railway companies.

The shipping accommodation at Liverpool has also been a matter of considerable complaint amongst colliery proprietors, and the above committee, who have taken this also into consideration, have suggested that a memorial should be presented by the trade to the Liverpool Dock Board, pointing out that the great facilities given at Birkenhead place the Welsh coal trade in a more advantageous position in Liverpool Harbour than the Lancashire trade, and requesting that the new North Dock should be specially adapted for the coal trade of this district. That the present shipping facilities at the north end should be improved, and that new facilities for shipment should be given at the south end, as no facilites for shipping coal exist there.

In the iron market, prices are a little firmer for the raw material, in consequence of the unsettled state of the men in the Durham district, merchants being afraid to commit themselves until they see how matters will turn. There has been a little better inquiry for foundry iron, but for forge iron there is no great demand. Manufactured iron is a shade easier, and good specifications can be placed at a reduction of 2s. 6d. per ton on the list prices. No. 3 foundry Middlesbrough iron, delivered in this district, is quoted at 67s. 9d. to 68s. 9d.; No. 4, 1s. to 1s. 6d. per ton less; and No. 4 forge at about 65s. 3d. Bars are worth about £8 16s. 6d., heavy rails about £7 10s., and light about £8 per ton delivered.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

The stormy unsettled weather of the past two weeks, and the continued prevalence of northerly winds, have had a singular effect upon the coal trade of the North of England. Notwithstanding the lock-out in South Wales, there has been a falling off in the shipments of gas and household coals from the Tyne Dock during the past fortnight of no less than 1000 chaldrons per day. The obstinate appearance of the lock-out in South Wales has had a stiffening effect

upon the price of steam coals, however, in the Northumberland district, though quotations do not exceed 16s. per ton for best and 14s. for seconds. Gas coals range from 10s. to 12s. per ton at the pits, and some large gas contracts have been entered upon within the past ten or twelve days at rates not exceeding the figures above quoted. Coke has kept pretty firm for exportation, and vessels that have been freighted to take out cargoes of coke to Spain have long turns.

Shipping business to the Mediterranean was again active last week, and above 100 sail of coal-laden steamers left the Tyne in three days, many of which were bound to the Mediterranean. Small coasting vessels of from five to ten keels keep extremely scarce in the coal ports, and are very much needed to load coals for the east coast and Channel ports, likewise for France and Ireland. More money has to be paid in freight to these places. There was also an advance in the value of freights to London last week; but, as soon as the fleet of light vessels, which have been detained in roadsteads by foul weather, get down, there will be a very active business in that direction, and freights will possibly fall again. At present the Baltic, the Sound, the Elbe, and other rivers in North Europe are locked up with ice, a second winter having appeared; and there is no business doing to the Baltic, nor will there be until there is open water again.

Trade has been firm in the Cleveland iron district. Makers of pig are asking 59s. for No. 3. Some more orders are coming into the finished iron trade, and, upon the whole, business in the iron district of the North of England has a more healthy look.

At the end of this week the fortnight's notice given by the Durham coal-owners to the pitmen of the termination of their present engagement will be up. Down to last Saturday the masters and men had not met, but it was hoped on 'Change that, during the early part of this week, some arrangement would be arrived at for a friendly settlement of the wages dispute without driving it to a strike. Of course, if it cannot, then nearly all the industrial operations in the county of Durham will be brought to a stand. But there was no very great alarm with regard to a prospect of that sort. A court of arbitration has been sitting in Newcastle to determine the question of a reduction of wages in the Northumberland coal district. There will be a meeting in London next week, when the whole of the facts will be summed up by the referee, Mr. Rupert Kettle, and an award will be made. The disputes in the iron shipbuilding trade of the Tyne, and those in the chemical works, are also likely to go to reference.

Notwithstanding we are upon the eve of what should be an active spring trade, the chemical business upon the Tyne is singularly dull. Crystals of soda and some other chemicals were lower last week, and manufacturers were rather disposed to take a desponding view of the situation. The general manufacturing trade of the North of England is only quiet. There is a pretty good demand, however, for bricks and other fire-clay goods.

The Corporation of Tynemouth has referred the question of the purchase or non-purchase of the North Shields Water-Works to a public meeting of the inhabitants. It is almost certain that the public meeting will negative the proposition.

The Inventor of the Bude Light.—Sir Goldsworthy Gurney died last week at his residence in Cornwall. Sir G. Gurney was the son of Mr. John Gurney, of Trevorgus, in Cornwall, and was born in the year 1793. For the last 11 years he has suffered from paralysis, and has lived a quiet and retired life at his country residence at Reeds, near Bude.

Institution of Civil Engineers.—At the meeting of this society on Tuesday, the 2nd inst.—Mr. Thos. E. Harrison, president in the chair—Messrs. W. B. Bryan, borough engineer, Burnley; D. M. F. Gaskin, engineering staff of the Liverpool Corporation; J. Hildred, borough surveyor, Batley; J. Joicey, Stocksfield-on-Tyne; J. Parry, engineering staff of the Liverpool Corporation; J. Rogerson, general manager of the Weardale Iron and Coal Company, were elected as associates.

Gas Explosion, near Tadcaster.—A fatal accident, resulting from an explosion of gas, happened on the 1st inst., at Grimston Park, the residence of Mr. Fielden. A new gas apparatus, it is said, had just been completed, and the steward, Mr. Swarbrick, perceiving a smell of gas in the lavatory adjoining the billiard-room, incautiously took a lighted taper to ascertain the cause; the result was an explosion, which blew off the roof of the room and smashed the large mahogany doors. Mr. Swarbrick was found buried in the ruins, severely burned, and with both legs broken. He died the next day.

Hull Gas Supply.—Mr. Baynes reports that the gas sent into the Sculcoates and Myton district during February was free from sulphuretted hydrogen and free ammonia. The illuminating power taken in the district averaged about 15½ candles. The results for the month are—

	Max.	Min.	Mean.
Illuminating power standard sperm candles	16·10	14·70	15·48
Grains of sulphur per 100 feet	29·00	27·50	28·30
Grains of ammonia per 100 feet	—	—	·60

Mean barometer and temperature in experiment-room:—Bar., 30·18; tem., 56°.

Guisbro' Gas Company.—A special meeting of the Guisbro' Local Board was held on the 17th ult., Mr. Coney presiding, for the purpose of considering a letter which had been received from the gas company respecting the non-payment of an account of £80 for lighting the town. The gas company having run a quantity of gas tar into the town drains, which eventually found its way to the town sewage farm, and caused considerable damage, a claim of £32 18s. 8d. was made against the gas company by the board, which the company, however, refused to entertain, and the board, in consequence, withheld payment of the company's account. A letter was now read from the solicitor to the gas company, demanding immediate payment, and intimating that the company did not consider themselves liable for the damage at the sewage farm. After a short conversation it was agreed to pay the £80, and to enter an action against the company for the amount claimed for damage.

Origin and Progress of Gas Lighting.—Mr. R. W. Brett, manager of the Hertford Gas-Works, has just given a lecture, in the Council Chamber at the Shire Hall, in connexion with the Hertford Literary Association, on "The Origin and Progress of Gas Making," with illustrations. A supply of gas was specially laid on from the street-mains to the table used by the lecturer, to enable him to give practical illustrations upon some portions of his subject; whilst other portions were made clear to the audience by the aid of several well-executed diagrams, which were so arranged that they could be seen by all present. Mr. Brett at first spoke upon the origin, or discovery, of gas; next upon its history, and general adoption for the purposes of private and public lighting; and then proceeded to show, with the aid of the special contrivances at his command, the complete process of its manufacture. He also clearly proved how it was possible for the purest and best gas to be deprived of its purity and power of illumination by the use of bad burners, many hundreds of which, he said, were in daily use in every town. In such cases gas companies were invariably blamed for that which was alone the fault of the burners used by the consumers. Mr. Brett said that Hertford was first lighted with gas in the year 1825, and was one amongst the first towns to adopt that system of illumination. The lecture was, on the whole, a most instructive and interesting one, and was given in the quiet, unassuming manner of a person who thoroughly understands his subject. The room was well filled during the evening, and at the close of the proceedings a hearty vote of thanks was passed to Mr. Brett, upon the proposition of Mr. A. P. M'Mullen, seconded by Mr. J. Adams.

Trowbridge Water Company.—The half-yearly meeting was held on the 27th ult.—Mr. S. Peed in the chair. The directors report stated that notwithstanding the great rainfall which has occurred since the opening of the works, the engineers report may be regarded as showing a satisfactory progress in the company's business. There is every reason to believe that when the dryer weather sets in, there will not only be a much larger accession of new services, but the supplies through meter for business purposes will very materially increase. With a view to induce the manufacturers and other residents to become consumers of water for trade purposes, the directors are considering a special scale of charges by meter for large consumers. In consequence of the unsettled claims for the purchase of mills and lands necessary for the company to acquire—for which deposits have been made under the Lands Clauses Act—and from the non-delivery of accounts for works done, the directors have been unable to prepare a perfect and complete statement of the accounts, which they have no doubt they will be in a position to do before the next meeting of shareholders, when they confidently anticipate that it will be found that the outlay of the company will not exceed the estimates. The engineers, Messrs. H. and C. Tomlison, reported that the new works continue in full operation, and that the quality of the water distributed from them is much appreciated by the consumers, and sufficiently justifies the character for which it was commended to the public. Water from the company's works is now laid on to 143 premises, of which 111 are rated as for domestic supply and 32 are supplied through meter for business purposes. The latter include some woollen manufactories, breweries, and the Government barracks. The income from some of these supplies through meter will be very considerable. The report was adopted, and a resolution was passed authorizing the consolidation of the £10 shares into capital stock.

Todmorden Gas Company.—The annual dinner of the *employés* of the above company was held at the Swan Inn, near the works, on Friday evening, the 26th ult. The chair was occupied by Mr. Thomas Priestley, one of the directors, and the vice-chair by Mr. H. C. Coles, the company's manager. The loyal toasts were duly honoured, and other toasts afterwards proposed, not least among them being, "The directors of the Todmorden Gas Company," to which Mr. Robert Allen, one of the directors, was asked to respond. Mr. Allen, on behalf of himself and co-directors, acknowledged with thanks the hearty manner in which the toast had been received, and, in the course of a few remarks, said that meetings like these were forcible contrasts to the unfortunate strikes and lock-outs now existing in South Wales, Dewsbury, and other parts of the country; he could not help thinking that many of these outbreaks arose from what appeared to him simple causes—from want of thought or from deficient education—from the want of a better knowledge of each other, but most of all from too little of the "give and take" principle being exercised amongst employers and employed. He hoped, however, that these disputes would soon be ended, for it was lamentable to hear of the suffering and distress caused thereby. He afterwards paid what he was sure the rest of the directors would fully endorse—a well-deserved compliment to their excellent manager—and concluded by congratulating the men on being ruled by one so thoroughly alive to the interests of his employers, and so practically acquainted with the duties of his office. The chairman (Mr. Priestley) afterwards proposed the health of the manager, which was received in an enthusiastic manner, and responded to in a few well-chosen sentiments by Mr. Coles, who, in conclusion, proposed the health of Mr. Ormerod, the chairman of the company. Mr. Rodley, surveyor to the local board (a visitor), responded to the toast of "The town and trade of Todmorden." He remarked that the improvement of the town would necessarily increase its commercial prosperity, and therefore be beneficial to all classes. The health of Mr. Priestley was then proposed, who, in acknowledging the compliment, advised the men to be cautious that their present conviviality did not interfere with their future attention to duties, but wished them to exercise a wise discretion in partaking of the good things during the remaining part of the evening. The formal business was then brought to a close, and the directors and visitors left at 10 p.m.

Portrush Water Supply.—On the 19th ult. a special meeting of the guardians of the Coleraine Union was held to receive a deputation from a meeting of the ratepayers of Portrush, with a request that the guardians would take measures to obtain for the inhabitants of that watering-place a supply of pure water. Mr. James A. Lyle occupied the chair, and a report was read from Mr. Tate, county surveyor, submitting a map of the lands upon which it was proposed to construct the works, which he considered a very eligible site. Having examined the different streams in the district, he had selected that which passes under the public road at the south side of Ballywilliam Glebe, in the townland of Crossreagh, as affording a source of supply which promises to be a very sufficient and desirable one, possessing, as it does, a convenient site for an impounding reservoir adjacent to the public road, at an elevation of 200 feet above mean sea level, whilst the quality of the water is, by repute, soft and pure. He estimated the population of Portrush, on the average throughout the year, at 2500, and giving 30 gallons per day to each head, the average quantity would be 75,000 gallons per day. He provides against protracted drought or sudden floods, and to prevent contamination by flax-water, storeage for 9 million gallons of water, the area of the catchment basin (400 acres) being quite sufficient for the purpose. The estimate provides for a considerable extension in the consumption of water—the storeage provided being equal to 120 days, which would be provided for by the erection of a suitable embankment across the valley, the centre of which would be about 60 yards above the public road, the intervening space being employed to furnish a filter-bed of adequate size, and a service reservoir able to contain three days' supply of clear water. From the latter, at about 180 feet above sea level, the supply would be taken by a 5-inch main, laid along the side of the road in a nearly straight course to the Bushmills Road, near the gas-works, and thence onward through Main Street, and the different branches, as shown on the map. The estimated cost is £3520, the items being—Forming main reservoir, £1100; filter-bed, £150; service reservoir, £300; mains, including requisite valves, plugs, &c., £1400; compensation for land, £250; incidentals, £320. After discussing the question, the guardians resolved to take the necessary steps to carry out the wishes of the deputation, and the clerk was directed to write to the Local Government Board to ascertain upon what terms a loan to execute the works could be obtained; Mr. Tate, in the meantime, to make out plans and specifications of the necessary works.

Tunbridge Wells Gas Company's Bill.—Agreement with the Commissioners.—At a meeting of the Improvement Commissioners of Tunbridge Wells on the 3rd inst., the committee appointed to watch the parliamentary proceedings of the gas company reported that a conference was held by them with the directors on the 25th ult., with a view to arriving at some satisfactory settlement of the points in dispute. Since the conference a letter had been received from Mr. Read, the secretary of the gas company, stating that the directors were prepared to make the following alteration and amendments in their present bill, to meet the requirements of the local board:—1. That the number of meters to be fixed to the public lamps shall not exceed one to every twelve lamps. 2. That the proposed new capital shall be reduced to £40,000, with a corresponding decrease of the borrowing powers. 3. That for gas supplied within the limits of the town, the maximum price shall not exceed 5s. per 1000 cubic feet when and so long as the price of coal delivered at the company's works shall be under 30s. per ton, and 5s. 6d. per 1000 cubic feet when it shall be 30s. and upwards per ton. 4. That the power of taking easements sought to be obtained by clause 23 of the bill shall be confined to the land described in the deposited plans. 5. That the local board shall be at liberty to test the public lamps for pressure at any time without giving notice of their intention to do so, but the company are not to be liable to penalties under the Gas-Works Clauses Act, 1871, for deficiency of pressure in any case when the prescribed notice has not been given. 6. That the company shall cease to manufacture gas on the present site from and after the 31st of December, 1878. Clauses to give effect to these alterations shall be sent to you for approval, if the local

board think them sufficient, but it must be understood that these concessions are made for the purpose of arriving at an amicable arrangement with the board, and that the company are not to be prejudiced by them in any way, should they fail to effect their intended object. The committee, having fully considered the matter, were inclined to think that if the new clauses of the bill were properly formed to give effect to these concessions, a parliamentary contest might be avoided, and they accordingly recommended that the same be accepted. The committee had only further to add that the resolution, of which notice had been given, to authorize a parliamentary opposition, would under any circumstances be required, on account of expenses already incurred. The recommendations of the committee were agreed to, and a resolution formally to oppose the bill was adopted, it being explained that unless this were done the expenses could not be charged upon the rates.

MEETINGS IN BRIEF.—*Gas Companies:* The report submitted by the directors of the Newark Gas Company to the meeting of shareholders on the 27th ult. stated that the net balance of the half year was £1280 19s. 1d. The directors recommended that a dividend of 7s. per share upon class A shares and new ordinary shares be declared, being at the rate of 7 per cent. per annum, and that the balance be carried forward towards the current expenses of the company. The number of new services laid down during the past half year was 14. The increase in private consumption, as compared with the corresponding half of 1873, was £115 16s. 7d. The Chipping Sodbury Gas and Coke Company held their annual meeting on the 23nd ult. Mr. Trenfield, the chairman, presided. A dividend of 6 per cent. was declared, free of income-tax. The report of the directors, which showed that the company are in a prosperous condition, was unanimously adopted. The annual meeting of the Howden Gas Company was held on the 1st inst., Mr. H. Tireman in the chair. The report of the directors was of a very satisfactory character. Instead of a deficit, as was shown in last year's account, the profits of the year amounted to £243 1s. 4d., out of which it was proposed to pay a dividend of 6 per cent., carrying a balance over of £78 1s. 4d. to the reserve-fund. The accounts were unanimously adopted. Mr. Tireman was re-elected a director, and Mr. J. Haigh was elected in the place of Mr. M. Green. Mr. George Green was re-elected auditor. A vote of thanks for his long-continued services was passed to Mr. George England, who had held the office of secretary for fifteen years—since the formation of the company—and who wished to retire. A vote of thanks was also accorded to the directors for their judicious management. At the half-yearly meeting of the Derby Gas Company on the 27th ult., the usual dividend at the rate of 10 per cent. per annum was declared. The annual meeting of the Cefn and Rhosymedre Gas Company was held on the 27th ult., when the report of the directors and the statement of accounts showed a balance of £186 8s. 8d. in favour of the company, out of which it was proposed to pay a dividend of 7 per cent., and place the balance to the reserve-fund which was agreed to.—*Water-Works Companies:* The half-yearly meeting of the Shrewsbury Water Company was held on the 23rd ult., at which the following report was submitted and adopted:—"The statement of accounts appended to this report will, it is believed, be satisfactory to the shareholders. The directors again recommend a dividend at the rate of 5 per cent. per annum. The extension at Ditherington, and a small one beyond Belle Vue, have been completed since the last half-yearly meeting. The water supply to a portion of the Coton Hill district having been the subject of complaint, the directors deemed it necessary to take up the main, which was found, on inspection, to have become very much deteriorated, and choked up by corrosion. The requisite new pipes have been laid with satisfactory results. The annual general meeting of the South Essex Water-Works Company (Grays) was held on the 23rd inst., at the Guildhall Tavern, Gresham Street, London, Mr. A. Smee, F.R.S., in the chair. The directors report and balance-sheet to the 31st of December last were received and passed unanimously. The retiring directors, Mr. Edmund Burke and Mr. Edward Charlton, were re-elected, and Mr. James Cooper (Messrs. Johnstone, Cooper, Wintle, and Co.) was re-elected auditor for the ensuing year. A dividend at the rate of 5 per cent. per annum (free of income-tax), for the half year ending the 30th of December, 1874, upon the paid-up capital of the company, was declared. The half-yearly meeting of the Brymbo Water Company on the 27th ult., the directors report stated that the gross revenue receipts for the half year had been £741 1s. 6d., as compared with £978 6s. 10d. in the previous half year, making with a balance from last year of £89 10s. 9½d. a total of £830 12s. 3½d. The working expenses had been £323 17s. 9d., leaving a net surplus of £506 14s. 6½d. The directors recommended a dividend at the rate of 6 per cent. per annum. At the meeting of the Camborne Water Company on the 25th ult., the directors stated in their report that the business had made encouraging progress during the past half year. About twenty new services had been laid on, principally on important properties, and thus a considerable increase had been made to the revenue of the company. The number of customers was 1417, an increase on the year of 171, and further applications were being made. The general state of the works was satisfactory, except that the limited condition of the company's finances would not admit of extension to off districts. The Cargenwyn reservoir had been full to overflowing since the early part of December last. No further outlay had been made upon the supplemental reservoir during the last six months. There were about a million gallons of water now in it. The accounts showed a credit balance of £602 on the revenue account.

WAKEFIELD GAS COMPANY.—The half-yearly meeting was held on the 22nd ult., Mr. Statter in the chair, who, in moving the adoption of the directors report, stated that the balance of profit for the half year was £3409 19s. 7d., which would allow of the usual dividend of 10 per cent. on the old shares, and 7½ per cent. on the new shares, clear of income-tax, and leave £130 to carry to the reserve-fund. Referring to the liabilities for the half year, the chairman said coals and carting cost £4162 9s. 7d., as against £5163 in 1873. They had now found it to their advantage to use more lime than they formerly did in the making of gas, and consequently the item for lime and oxide had increased from £40 to £171 7s. 10d. There was also a great increase in the amount paid for salaries and wages, the amount for the last half year being £1705 4s. 4d., as against £1557 in the corresponding half year. This was caused by the directors having been compelled to give higher wages, their stokers now receiving 30s. per week. Rates and taxes amounted to £237, as against £274; tradesmen's accounts £1102, as against £684; and bankers interest and commission £145, as against £113. The total amount of the liabilities was £7524, as against £10,035 a year ago; but they then got 4s. per 1000 for their gas, as against 3s. 6d. per 1000 now. Alluding to the receipts, the chairman pointed out that for gas, and for rent for meters and fittings, they realized £8450 last half year, as against £9262 and £8627 in the two previous half years. They did not obtain so much for their coke now as formerly, as the price had been reduced from 15s. to 8s. 4d. per ton. Last half year the coke sold produced £1159, as against £1797 in the corresponding six months of 1873. Tar had now become a very valuable article in the market, as it is now largely used for dyeing purposes, and last half year it produced them £828, as against £372. Ammoniacal liquor had also become much more valuable, and he believed that in future they would be able to sell both it and tar for considerably more than they had been able to obtain for it hitherto. During the last six months the ammoniacal liquor sold for £427, as against £232 in the corresponding half year. The other items on the credit side of the account were about the same as formerly. The total receipts were £11,034. The company was now suffering from an excess of cash, for they had £2000 more than they were entitled by their Act of Parliament to have, and therefore they would be obliged, whether they were willing or not, to reduce their price of gas. The directors did not intend to wait until they were asked by the corporation, or any one else, to make the reduction, but they intended to make it voluntarily on the 1st of July. They would perceive from the capital account that the balance of uncalled capital amounted to £3112 18s. 2d., and it would be necessary for the directors to make another call. It might therefore be as well for him to give them notice that the directors would be obliged to make a call of £1 per share on the new shares on the 1st of July next. After replying to some remarks by shareholders, the chairman said he had gone back seven years to ascertain the quantity of gas supplied by the company, and he found it to be as follows, taking the round numbers:—1868, 87 million feet; 1869, 95 million; 1870, 99 million; 1871, 101 million; 1872, 99 million; 1873, 100 million; 1874, 113 million. Referring to the decrease in the quantity supplied in 1872, the chairman said that was the year when the Licensing Act came into operation, and it made a considerable difference in the consumption of gas in consequence of the public-houses being closed earlier. He believed that during the current half year the company would feel the effect of the new Factory Act just in the same way, because the Act cut off half an hour from each day's working hours at the mills. The report having been adopted, the usual dividend of 10 per cent. on the old shares, and 7½ per cent. on the new shares, was declared, free of income-tax, and votes of thanks were given to the chairman and directors for their services.

Register of New Patents.

2169.—LAKE, W. R., Southampton Buildings, London, "*An Improved process and apparatus for making illuminating gas.*" A communication. Patent dated June 22, 1874.

The object of this invention is the production of illumination gas by decomposing steam, and uniting the resulting gas, together with the gases given off by red-hot coal when the steam is passed through it, with hydrocarbon vapours, by which a permanent or fixed gas of high illuminating power may be produced at a very cheap rate. To effect this, generators are provided with a fire-grate, a smoke-pipe having a valve for closing the same, and a mouth above and below furnished with lids. In combination with these generators, pipes are arranged provided with suitable valves, and arranged to admit steam at the top or bottom of the generator. A removable vaporizer is also employed, provided with a transverse groove and longitudinal grooves. The oil as it is delivered falls into the transverse groove or trough, whence it flows gradually along the other grooves, of which there may be any number, and is thus vaporized without coming in contact with the retort while in a liquid state. A steam-boiler is combined with one or more of the generators constructed and arranged to heat the coal therein and pass the steam downward through it, and with one or more retorts arranged to vaporize a hydrocarbon and mingle and heat the vapours in the said retort.

The retorts are constructed with a lid at each end, so as to afford more ready access to their interior, it not being necessary to remove them from the furnace, though, as previously stated, other forms of retorts may be used if desired. By so constructing and arranging the apparatus that the steam is made to pass downward through the mass of incandescent coal in the generators, much better results are obtained than can be obtained by allowing it to pass either upward or horizontally through the coal. As the natural tendency of the steam and the gases of combustion is to rise, it follows that when admitted above the coal the steam will fill the entire cross section of the generator, and as the volume increases will pass down through the coal, filling the entire space until it escapes below. By this method the steam is not only made to take up all the oxide gas, but it is brought into direct contact with every particle of hot coal, enveloping each and every piece of it on their entire surfaces. Moreover, as it fills the entire generator from top to bottom, and will flow out at the bottom only as the volume is increased at the top, a much larger quantity of steam is held in contact with the hot coal, and for a longer time, whereby it is more effectually decomposed, and takes with it more of the gases of combustion, thus producing the desired result far more effectually than by any other means.

When steam is admitted below and allowed to pass up through the coal, it may pass up along one side or at the centre only, and as it is heated still by contact with the coal it will pass through very quickly, and without coming in contact with all the coal; so when it is passed through horizontally it will flow along the upper side of the vessel, and will not be brought into intimate contact with the entire mass of coal; hence this passing of the steam downward through the coal is considered a very important feature of this invention. The gas is taken from a retort that is lower than the one immediately preceding it, by which means it is held in the previous retort until forced out by the volume behind, thus tending to retard its flow and hold it in the heated retort until the different vapours are thoroughly mingled and chemically united, rendering the product a fixed and permanent gas not liable to condense at any ordinary temperature even in the coldest winter weather. The gas thus produced is carburetted, hydrocarbonic oxide of specific gravity of 700, air being taken at 1000 as a standard. It is free from sulphur and phosphorus, and does not require to be washed or purified, but is ready for use as it comes from the works. It does not gum up the burners nor condense, even at a low degree of temperature, but remains a permanent fixed gas at all times ready for use, the same as the ordinary illuminating gas. It can be made of any degree of richness desired up to at least 30-candle power. No carbon is formed in the retorts, and hence there is not the usual delay required for cleaning them. The vaporizer, being detached, can be removed from the retort, and a fresh one supplied whenever necessary.

2220.—TACKLES, C. J., Brussels, "*Improvements in gas-burners.*" Patent dated June 26, 1874.

The object of this invention is to moderate and regulate the supply of gas used for purposes of illumination.

The apparatus by means of which this object is effected is composed of three parts—1. A cap or cover provided with one hole, to which may be attached either the gas-burner or the piece which receives the same. 2. An obturator, the stem of which is tubular and having a screw thread, and longitudinal or oblique slits or openings therein. The head of the tubular screw is in the form of a thumbscrew. 3. A mushroom-shaped piece, the upper part of which carries the obturator, whilst the lower parts screw on to the supply-tube.

This mushroom-shaped piece is of a conical form, with four vertical grooves, and being perforated, the hydrocarbon gas passes through it. The cone is provided with a cover which acts as a moderator or regulator, and prevents any irregular pressure at the gasometer or source of supply from being felt. The gas issues from under the cover by the grooves or slits in the cone, and flows into the cap, at the bottom of which are three circular indentations through which the gas is obliged to pass, when by too great a pressure the cover is raised and the ordinary passage is obstructed.

On the cap is screwed a gas-burner of a cylindrical "ogival" form, the top of which resembles a large thimble in which is a slit. A space is provided which constitutes a condensing receiver, with the sides of which the gas comes in contact on issuing from the openings, and thus forming a cross current, is impelled by centrifugal force towards the burner.

By means of these arrangements the hydrocarbon gas is purified, and any irregular pressure arrested. The gas arrives slowly and regularly towards the orifice, at which it is consumed under a very light pressure, whereby steadiness and a regular form are imparted to the flame, and the illuminating power increased; whilst the smoke and noxious emanations from the hydrocarbon gas

are also got rid of, and a large saving varying from 35 to 50 per cent. in the gas consumed, is attained.

The obturator with its longitudinal or oblique slits receives the gas through the tubular screw, in which is placed a stopper or valve with an obturating shoulder. The gas which escapes is compelled to pass through the regulating openings. It is by means of these openings that the consumption of gas and the height of flame for illuminating purposes in manufactories and other large buildings, according to the number of storeys to be supplied, is regulated.

The lower portion of the mushroom-shaped part is applicable to all kinds of burners, whether placed horizontally or vertically.

In applying a moderator or regulator to each burner between the cock and the piece carrying the burner or directly on the cock, the object is not only to effect a saving but also to prevent the emanations from the gas, which are so unpleasant, and injurious in schools and at large meetings or assemblages of persons, in which cases a wholesome atmosphere is of primary importance.

2243.—BISCHOF, G., Andersonian University, Glasgow. "*Improvements in the construction of filters, and in the preparation of materials used for the purification of water.*" Patent dated June 29, 1874.

In this improved construction of filters a dished bottom is provided under the ordinary perforated bottom, separating it from the receptacle for the filtered water. A bent pipe leads from this dished bottom to the exterior, where it is stopped by a cock or plug; and a small hole in the bent pipe gives passage for the filtered water to the receptacle, the hole being so adjusted in size as to prevent a rush of water through the filter when a quantity is withdrawn. The bent pipe serves also to discharge the water used for cleaning the filter. The porous balls or slabs ordinarily used for filtering are impregnated with a solution of a salt of iron, and the ferrous oxide of iron is precipitated in their pores by impregnating them with an alkali or alkaline carbonate. This oxide becomes by exposure hydrated ferric oxide, which has a purifying effect on the water, and which may be directly mingled with the filtering materials.

2246.—MURDOCH, H. H., Staple Inn, London. "*Improvements in closing the ends of metal pipes, and in connecting and soldering metal pipes together, and in the combination of metals or alloys for the latter purpose, parts of which improvements are applicable to other purposes.*" A communication. Patent dated June 29, 1874.

According to these improvements, a peculiarly shaped collar, screwed externally, is placed in the mould in such a position that when the pipe is cast the collar shall be securely fixed thereon. The pipe may then be closed by means of a cap in which is formed a screw-thread corresponding with that on the collar. Instead of screwing the cap to the collar on the pipe, it may be secured by means of lugs on the collar engaging with inclines on the cap.

The invention consists further in connecting metal pipes together by means of a sleeve lined with solder, in combining fine and coarse solder in various forms, which may be cast in a suitable vessel, and pressed out through a die in the form of bars, tubes, rods, or sheets. This part of the invention is also applicable to the manufacture of foil.

2270.—CLARK, A. M., Chancery Lane, London, "*Improvements in the manufacture of gas and fuel.*" A communication. Patent dated June 30, 1874.

This invention relates to the production from naphthaline and its congeners, prepared as hereinafter described, of rich gas for illuminating and heating purposes.

Naphthaline has not hitherto been applied for the manufacture of gas on a commercial scale, and to this end it is first necessary to find some liquid hydrocarbon rich in hydrogen, and capable of being decomposed at the same degree of heat as naphthaline itself in order that this hydrocarbon mixture may be absorbed by a porous body, which on being decomposed will itself yield proto-carburetted hydrogen. To this end the pretentee proceeds as follows:—He prepares a liquid carburet of hydrogen from heavy petroleum oil or other hydrocarbon, which will be decomposed at the same temperature as naphthaline. For this purpose he takes crude naphthaline, obtained from heavy gas oils, and heats it to from 100° to 120° Fahr. in order to liquefy the same, and he then adds, according to the richness of the gas to be produced, from 5 to 20 or 25 per cent. by weight of prepared petroleum oil or other hydrocarbon decomposing at the same temperature as naphthaline.

In one or other of these baths, heated to from 100 to 120° Fahr., he immerses peat or other dried and prepared porous body capable of yielding proto-carburetted hydrogen. This porous substance is caused to imbibe from 1 to 14 per cent. of the prepared naphthaline, which may be effected either by immersion or under pressure. In this condition the peat or product carburetted as described will yield in ordinary gas apparatus from 13,000 to 14,000 cubic feet of rich gas per ton, in addition to from 5 to 6 hundredweight of carbonized peat coke. The gas produced possesses, according to the composition of the bath employed, an illuminating power of 7 to 24 candles, with a consumption of 3·7 cubic feet of gas per hour.

Peat carburetted as above described will give excellent results when used alone, but in order to obain a product adapted for the production of gas, and to replace the cannel coal and Boghead used to enrich common coal gas, which produces little if any coke, peat carburetted as before mentioned is imployed in the proportion of from 60 to 70 parts by weight, good gas coal 30 to 40 parts, and lime 1 part. These proportions may, however, be varied. The matters are ground up together with 10 to 12 per cent. of a mixture of coal and wood tar, and afterwards compressed and moulded into blocks of any suitable form. One ton of this material will produce from 14,000 to 15,000 cubic feet of gas of 18 to 20 candle power, with an expenditure of 3·7 cubic feet of gas per hour, in addition to half a ton of its vegeto-mineral coke, which, owing to its perosity, and the nature of its composition will form a perfect substitute for all kinds of domestic fuel.

APPLICATIONS FOR LETTERS PATENT.

622.—SPEIR, R., Greenock, and MATHER, J., Gateshead-on-Tyne, "Improvements in the manufacture or production of gas for illuminating or heating purposes, and for actuating gas-engines." Feb. 20, 1875.

625.—MORGAN, O. V., Kensington, and MOELCHAERBK, G. R., Battersea, London, "Improvements in filtering and purifying water." (Complete specification.) Feb. 20, 1875.

649.—ROWLEY, S. H., Swadlincote, "Improvements in water-closets." Feb. 22, 1875.

660.—BATES, G., Lowes, "Improvements in apparatus for attaching main-cocks, valves, plugs, or other connexions to service-pipes for water when under pressure." Feb. 23, 1875.

668.—NEUHAUS, M., Strand, London, "Improved means and appliances for the production of lighting and heating gas from air and spirituous vapour combined." Feb. 23, 1875.

678.—WIRTH, F., Frankfort-on-the-Maine, Germany, "Improvements in stop-valves." A communication. Feb. 24, 1875.

681.—JOHNSON, J. H., Lincoln's Inn Fields, London, "Improvements in the treatment of gases, liquids, and pulverulent substances, and in the machinery or apparatus employed therein." A communication. Feb. 24, 1875.

693.—STORER, J., Birmingham, "Improvements in water-closets." A communication. Feb. 25, 1875.

694.—BOULTON, M. P. W., Oxford, "Improvements in apparatus for condensing steam or vapour." Feb. 25, 1875.

696.—QUICK, J., jun., and RESTLER, J. W., Westminster, London, "Improvements in meters for measuring liquids." Feb. 25, 1875.

715.—TROTMAN, S., Stowmarket, "Improvements in the mode and means of generating and inflaming gaseous vapour in lamps or other apparatus containing petroleum, spirit, or other hydrocarbon fluid or highly volatile oils." Feb. 26, 1875.

721.—KELEN, L. V., Brussels, "An improved gas-stove." Feb. 26, 1875.

724.—REYNOLDS, O., Manchester, "Improvements in apparatus for obtaining motive power from fluids, and also for raising or forcing fluids." Feb. 27, 1875.

734.—CHAMBERS, A., Marylebone Road, London, "Improved apparatus for facilitating the ignition of gas in the lamps of railway carriages." March 1, 1875.

737.—KEIRBY, J. E., Swinton, Lancaster, "Improvements in elastic and other packings for pistons and piston-rods of steam-engines, pumps, rams, and other similar purposes." March 1, 1875.

744.—DICKSON, J. F., Leicester, "Improvements in air and gas engines or motors." March 1, 1875.

GRANTS OF PROVISIONAL PROTECTION.

504.—WIER, M. A., Abchurch Lane, London, "Improvements in apparatus for measuring the flow of liquids." Feb. 11, 1875.

507.—BROADFOOT, J., Glasgow, "Improvements in water-closets." Feb. 11, 1875.

531.—KIDD, J., Dartmouth Street, Westminster, "Improvements in the manufacture or production of gas for heating or other purposes, and in the materials and apparatus or means employed therein." Feb. 13, 1875.

563.—CLARK, A. M., Chancery Lane, London, "Improvements in the production of ammonia." A communication. Feb. 16, 1875.

564.—RICHARDSON, J., Lincoln, and BALL, C. J., Blackfriars, London, "Improved arrangements of engine and boiler, with air or gas compressing apparatus in combination." Feb. 16, 1875

573.—HALLSWORTH, S., and BAILES, R., Leeds, "Improvements in the method or means employed in treating and clarifying sewage, or other impure waters." Feb. 17, 1875.

NOTICES TO PROCEED.

3611.—LACK, P. J., Westmoreland Place, London, "Improvements in valves for regulating the supply of gas, and in other fittings connected with gas-burners." Oct. 20, 1874.

3641.—HORNE, R. R., Glasgow, "A new or improved refractory or fire-resisting material which may be used for the construction of retorts and other articles having to resist the action of heat, the same being also applicable as a hydraulic cement." Oct. 22, 1874.

3658.—PARKER, T., Birmingham, and WESTON, P. A., Coalbrookdale, Salop, "Improvements in direct-acting pumps worked by steam, compressed air, or water, which improvements may also be applied to motive-power engines worked by steam, compressed air, or water." Oct. 23, 1874.

3719.—PAGET, F. A., Adelphi, London, "Improvements in centrifugal pumps for raising and forcing liquids, and in centrifugal pumps or fans for exhausting and blowing gases." A communication. Oct. 27, 1874.

3879.—CLARK, A. M., Chancery Lane, London, "Improvements in the musical instrument known as the pyrophone, together with the application of the same." A communication. Nov. 11, 1874.

4382.—ALLEN, S., Liverpool, "Improvements in and applicable to packing or rendering tight the spindles of throttle-valves, stop-valves, and other like valves." Dec. 19, 1874.

156.—JOHNSON, S. H., Stratford, London, "Improvements in cocks or valves." Jan. 14, 1875.

184.—WALLER, G., Southwark, London, "Improvements in apparatus used in the manufacture of gas." Jan. 18, 1875.

531.—KIDD, J., Dartmouth Street, Westminster, "Improvements in the manufacture or production of gas for heating or other purposes, and in the materials and apparatus or means employed therein." Feb. 13, 1875.

558.—OUTERSON, J. and A., Connecticut, U.S.A., "An improved filter." Feb. 16, 1875.

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625.—MORGAN, O. V., Kensington, and MOELCHAERBK, G. R., Battersea, London, "Improvements in filtering and purifying water." Feb. 20, 1875.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

2894.—HULETT, D., High Holborn, London, "Improvements in street and other lamps or lanterns, and in apparaus for regulating the supply of gas thereto, and to other gas-burners." Aug. 24, 1874.

2915.—HILL, F. B., Southwark, London, "Improvements in connecting apparatus for coupling hose and other pipes, and securing covers on pipes and in other situations." Aug. 26, 1874.

2962.—SUDLOW, W. E., Oldham, "Improvements in rotary engines for obtaining motive power, and for raising and forcing fluids." Aug. 29, 1874.

2978.—JOHNSON, J., and ANDREW, E., Manchester, "Improvements in metallic packings for pistons, air-pump buckets, valves, and other purposes." Sept. 1, 1874.

3058.—LAKE, W. R., Southampton Buildings, London, "Improvements in portable hydrogen and carburetted hydrogen gas apparatus. A communication. Sept. 5, 1874.

3205.—CROSSLEY, F. W., Manchester, "Improvements in gas motor engines." Sept. 19, 1874.

3318.—WALLACE, J., Newcastle-on-Tyne, "Improvement in gas-burners and in apparatus connected therewith." Sept. 28, 1874.

3382.—PARKMAN, E., Tennessee, U.S.A., "Improved means to be applied to lamps or lanterns to indicate the names of streets or other information, which means will also assist in reflecting the light from such lamps or lanterns." Nov. 11, 1874.

4305.—SCOTT, H. Y. D., Ealing, London, "Improvements in the treatment of sewage and night-soil." Dec. 14, 1874.

4363.—GILL, D., Weston-super-Mare, "An improved method for relieving private drains of sewer or drain gas." Dec. 18, 1874.

4386.—SPEIR, R., Greenock, and MATHER, J., Gateshead-on-Tyne, "New or improved apparatus which may be used for condensing vapours or gases for heating liquids, for purifying and bleaching oils and gases, and for other analogous purposes." Dec. 21, 1874.

4404.—MUNFORD, A., South Petherton, Somerset, "Improvements in apparatus for lighting and extinguishing street and other lamps." Dec. 22, 1874.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £100 BEFORE THE EXPIRATION OF THE SEVENTH YEAR.

257.—BELL, T. L. G., "Improvements in preparing oxide of iron for purifying gas, and in treating the oxide of iron residues to obtain products therefrom." Jan. 24, 1868.

427.—ROTHWELL, P., "An improved regulating valve for the delivery of specific quantities of gas, water, or other fluids." Feb. 8, 1868.

545.—KIRKLAND, J., "Improvements in the construction of pumps." Feb. 19, 1868.

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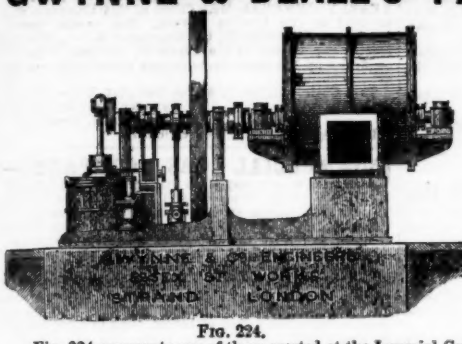

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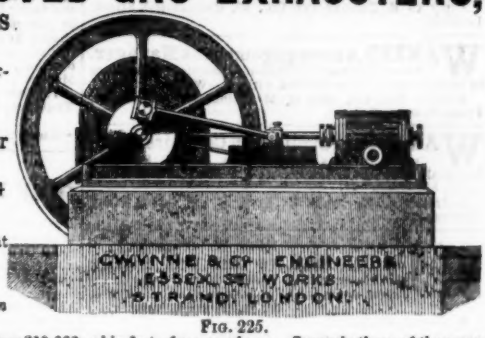

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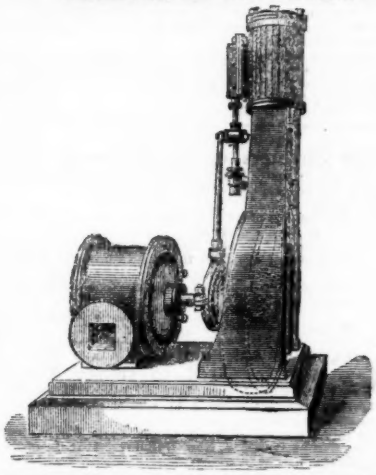

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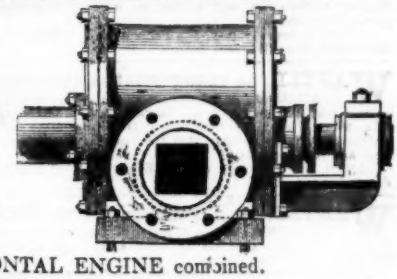

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Apply, by letter, stating full particulars as to last situation, salary required, hours of business, &c., to No. 137, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Service-Layer and Meter-Fixer. Part of his duty would be to superintend the public lamps and assist at the quarterly inspection of meters.
Applications, with references, age, experience, and wages required, to be addressed to the MANAGER, Gas-Works, GLOUCESTER.

MACCLESFIELD CORPORATION GAS-WORKS.

WANTED immediately, a Retort SETTER, who must be steady, and willing to make himself generally useful. Wages 30s. per week. Hours from 6 a.m. to 5.30 p.m.
Applications, with testimonials, to be addressed to WILLIAM CARR, Esq., Chairman of the Gas Committee, MACCLESFIELD.

WANTED, a situation as Manager of Gas-Works, making 10 to 25 millions. Advertiser has a thorough practical knowledge of the management, design, and construction of works, and having private means, salary is not of importance. Payment by results, preferred.
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WANTED, by a practical Man, the MANAGEMENT of a small GAS-WORK for a nobleman or gentleman. Is well accustomed to the erection and management of small Gas-Works, with single or double action retorts, and is a good fitter. Good reference and testimonials.
Address M. M., 42, Bosworth Road, Westbourne Park, LONDON.

TO GAS MANAGERS.

A Young Man seeks a situation as Main and SERVICE LAYER. Can work at indoor fitting, and be well recommended from last situation. Aged 27.
Address J. WILLIS, 27, James Street, WORCESTER.

SALESMAN in the Gas Chandelier and Fitting trade required. Good reference indispensable.
Address, stating time employed in last situation, salary required, &c., No. 138, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

THE Dumbarton Corporation, Gas Department, have for SALE two Dry Lime PURIFIERS, 12 ft. by 6 ft. by 4 ft. deep, with malleable iron covers, 8-in. connexions, and two Hydraulic Valves for working same. The above are in good condition, and are to be sold in consequence of being too small.
For further particulars, apply to JAMES M'GILCHRIST, Manager.

TO GASHOLDER MAKERS.

THE Colne Gas Company are prepared to receive TENDERS for the making and erection of the Outer Lift of a Telescope GASHOLDER, 66 ft. 6 in. in diameter, and 16 ft. deep, with all necessary columns, chains, &c.
Plan and specification may be seen, and full particulars obtained, on application to Mr. Thomas Varley, the Manager.
Tenders to be sent to me, the undersigned, on or before Thursday, the 18th day of March, 1875.
CHARLES TATHAM, Clerk to the Company.
Gas-Works, Colne, Lancashire, Feb. 27, 1875.

TO GASHOLDER MAKERS.

THE Directors of the Stourbridge Gas Company are prepared to receive TENDERS for a Double-Lift GASHOLDER, 80 ft. diameter, to be erected at their works.
All Gasholder Manufacturers intending to send in tenders may see the drawings and specification, and copy the same, on application to the Manager, at his Office.
Sealed tenders, endorsed "Tender for Gasholder," must be sent to the undersigned, not later than Friday, the 12th day of March next.
The Directors do not bind themselves to accept the lowest or any tender.
W. NORTH, Manager.
Gas-Works, Stourbridge, Feb. 23, 1875.

THE Newton-in-Mackerfield Improvement Commissioners invite TENDERS for supplying and fixing four 12-ft. PURIFIERS, Centre-Valve, &c., at their Gas-Works, Crow Lane, where the drawings and specification may be seen on application to the Manager, at the works.
Tenders, endorsed "Tender for Purifiers," to be forwarded to me not later than the 3rd day of April next.
The lowest or any tender not necessarily accepted.
R. BRIERLEY.
Town-Hall, Newton-le-Willows, Lancashire,
March 6, 1875.

The Commissioners will have for disposal four 6-ft. Purifiers, with dry centre-valve and 8-in. connexions, in complete working order, for which offers are invited.

THE Local Board for the District of Hindley, Lancashire, are prepared to receive TENDERS for the supply, fixing, and completing all connexions and pipes, for a new BENCH of 70 RETORTS, with two wrought-iron Hydraulic Mains; also one 12-in. EXHAUSTER, with Engine combined, and one Boiler.
Drawings and specifications may be seen at the Gas-Works, Cross Street, Hindley, on application to the Manager.
All tenders to be sent in not later than Monday, March 15, 1875.
Tenders must be sealed, endorsed, and addressed to the Chairman of the Board.
No allowance made for tenders, nor do the Board bind themselves to accept the lowest or any tender.
By order,
STEPHEN HOLT, Clerk.
Offices, Cross Street, Hindley, Feb. 24, 1875.

TO GASHOLDER CONTRACTORS AND OTHERS.

THE Directors of the Market Bosworth Gas Company invite TENDERS for the supply and fixing of the following APPARATUS:—
Gasholder, 36 ft. by 12 ft., with columns, girders, &c., complete.
Two Purifiers, 7 ft. by 4 ft., with valves and lifting apparatus.
Iron Roof for Retort-House, 41 ft. by 29 ft. 6 in.
Four-ft. Scrubber, 6-in. Condenser, 6-in. Governor, and 4-in. Station-Meter.
Also about 2000 yards of 6-in. 4 in. and 2-in. Main-Pipes.
Drawings and specifications may be seen on application to the undersigned, or tracings and copies may be had, on receipt of one guinea.
Tenders to be sent in to me on or before the 24th of March.
The Directors do not bind themselves to accept the lowest or any tender.
J. SURL, Engineer.
Gas-Works, Hinckley, March 6, 1875.

CRYSTAL PALACE DISTRICT GAS COMPANY.
NOTICE is hereby given that the ORDINARY HALF-YEARLY GENERAL MEETING of this Company will be held at the London Tavern, Bishopsgate Street, London, on THURSDAY, the 25th day of March, 1875, to receive the Report of the Directors, the Balance-Sheet confirmed by the Auditors, to declare a Dividend, and for general business.
The Chair will be taken at half-past Three o'clock precisely.
By order of the board,
MAGNUS OHREN, Secretary.
Lower Sydenham, S.E., March 6, 1875.

COMMERCIAL GAS COMPANY.—NOTICE is hereby given that the next ORDINARY MEETING of the Company will be held at the London Tavern, Bishopsgate Street, in the City of London, on FRIDAY, the 2nd day of April next, at Twelve o'clock at noon, to receive the Report of the Directors, and to declare a Dividend to the 31st day of December last.
The Directors going out of office are Thomas Brushfield, Thomas Lulham, and Griffith Thomas, Esqrs., who, being eligible, offer themselves for re-election. Henry Webb, Esq., Auditor, will go out of office by rotation, and, being eligible, has given notice of his intention to offer himself for re-election.
The Books of the Company will be closed for the Transfer of Stock from the 17th day of March, to the 2nd of April now next ensuing.
By the Company's Act of Incorporation, the holders of Stock can inspect the Books of the Company during one fortnight before and one month after the Meeting.
By order of the Board,
GEORGE JAQUES, Secretary.
Stepney, March 5, 1875.

THE Appledore Gas Company, Limited, are prepared to receive TENDERS for the supply and delivery of about 2 miles of 2-in. to 4-in. Cast-Iron MAINS, also price for laying the same.
For particulars apply to Mr. GEORGE BAKER, Secretary to the Company, Appledore, NORTH DEVON.

THE Directors of the Kingsbridge Gas Company invite TENDERS for an EXTENSION of their works; and a separate TENDER for the erection of a small SCRUBBER.
Particulars may be obtained of the Secretary, to whom tenders should be sent, before Friday, the 2nd day of April.
The Directors do not bind themselves to accept the lowest or any tender.
W. JARVIS, Secretary to the Company.

TO PIPE-FOUNDERS.

THE Directors of the Gloucester Gas Company invite TENDERS for about 3500 yards of 8-inch and 130 yards of 24-inch Spigot and Socket Cast-Iron PIPES.
Specification, and other particulars, may be obtained on application to the undersigned.
Offers, endorsed "Tender for Pipes," and addressed to me, to be delivered not later than the 15th day of March next.
The Directors do not bind themselves to accept the lowest or any tender.
R. MORLAND, Engineer.
Gas-Works, Gloucester, Feb. 19, 1875.

TO MAKERS OF GAS PURIFYING WOOD SIEVES.

WE are prepared to supply Wood WASHERS for going between bars, either parallel or bevel, in quantities made by special machinery, on moderate terms to the trade.
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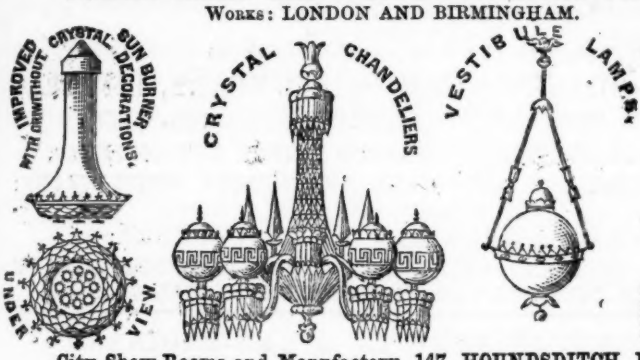

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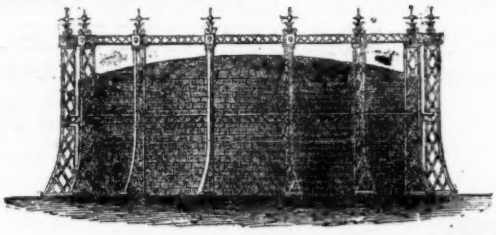

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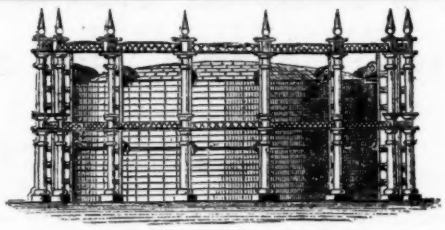

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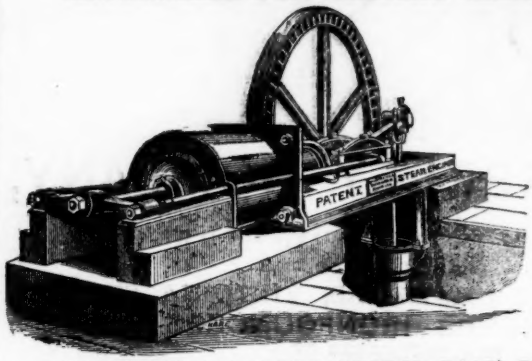

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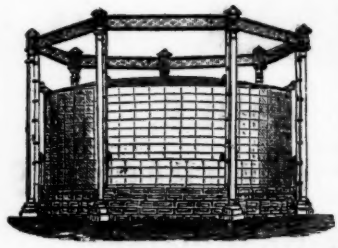

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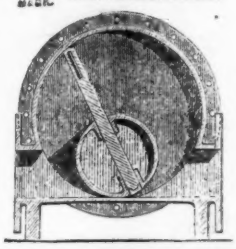

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Estimates and Prices on application to

B. DONKIN & CO.,

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OXIDE OF IRON.—We are prepared to supply, on moderate terms,

HYDRATED PEROXIDE OF IRON (BOG OCHRE),

Same quality as supplied by us to several of the most extensive Gas Companies, and which has given entire satisfaction.

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ALFRETON IRON-WORKS, DERBYSHIRE,

AND

WENLOCK IRON WHARF, 20 & 22, WHARF ROAD CITY ROAD, LONDON, N.,

Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water Works, including Iron Retorts, Socket and Flange Pipes, Bends, Branches, and Syphons of all sizes, Lamp Columns, &c., &c.

N.B.—Orders for Cast-Iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention. CHARLES HORSLEY, Agent.

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AND

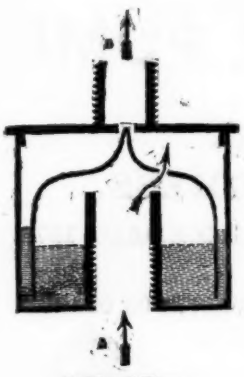
GENERAL FOUNDERS.

ESTIMATES and PRICES on APPLICATION.

GIROUD'S PATENT RHEOMETER.

Sole Licensees and Agents for the United Kingdom of Great Britain,

SIDNEY LEONI AND CO.



Sectional View.

Glycerine neither evaporates nor freezes at ordinary degrees of temperature.

Inside a Lamp.

Under a Globe Burner.

The RHEOMETER is a new apparatus of measurement; it is entirely made of "metal," and works "inside a closed vessel." It determines the quantity of gas to be consumed; and this quantity remains unchangeable, whichever be the burner employed, and whatever be the pressure.

ADVANTAGES.

For Domestic Purposes.—Saving of Gas.—Possibility of adopting low-pressure burners, which give as much as "four times more light" than the others, with the same volume.

For Gas-Works.—It is no longer necessary to consider any differences of level, or any variations in pressure. Alterations in burners, or a change of burners, will not affect the consumption. The quantity stipulated by contract is always supplied to all the lamps.

Subscriptions by the hour are no longer a matter of difficulty; in such cases the "sealed" Rheometer replaces the ordinary meter.

For Town Lighting.—The Rheometer is a guarantee that the contract for lighting is duly carried out. Thus, good burners may be adopted, and the lighting thereby improved, without the gas company having any interest in intervening to oppose such a measure.

All Orders should mention what quantity per hour the Rheometer is intended to regulate.

Depot: At the ECONOMIC GAS STOVE COMPANY, 74, STRAND, ADELPHI, W.C.,

WHERE THEY MAY BE SEEN IN ACTION.

Adamas Works: 54 to 66, ST. PAUL ST., NEW NORTH ROAD, N. Offices: 19, GT. GEORGE ST., WESTMINSTER, S.W.

One Sample Rheometer sent Carriage Paid to any part of the Kingdom on receipt of 5s. in Stamps.

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CAFFALL, THOMAS, & CO.,
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Patentees and Manufacturers of the
IMPROVED MOVEABLE SEAL FOR DIP-PIPES,
Now used with great success at numerous gas-works throughout the kingdom.

Testimonials and Prices on application.

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With all the joints planed.
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WAS AWARDED, AT THE
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AT LILLE—GOLD MEDAL - - - - 1874. AT MANCHESTER—SILVER MEDAL - 1874.

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"The simplest machine of its kind."—*Engineering.*
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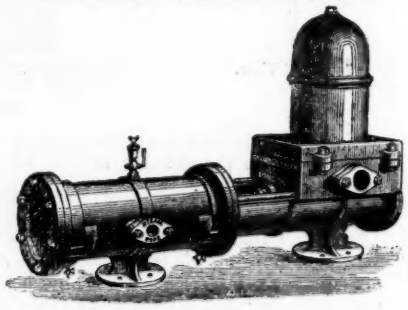
TAR AND AMMONIACAL LIQUORS.

NO TAPPET VALVES OR GEAR.



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"Sir,—The 'Universal' Steam Pump obtained from you, and which has been employed during the last six months pumping caustic soda at these works, still continues working satisfactorily,

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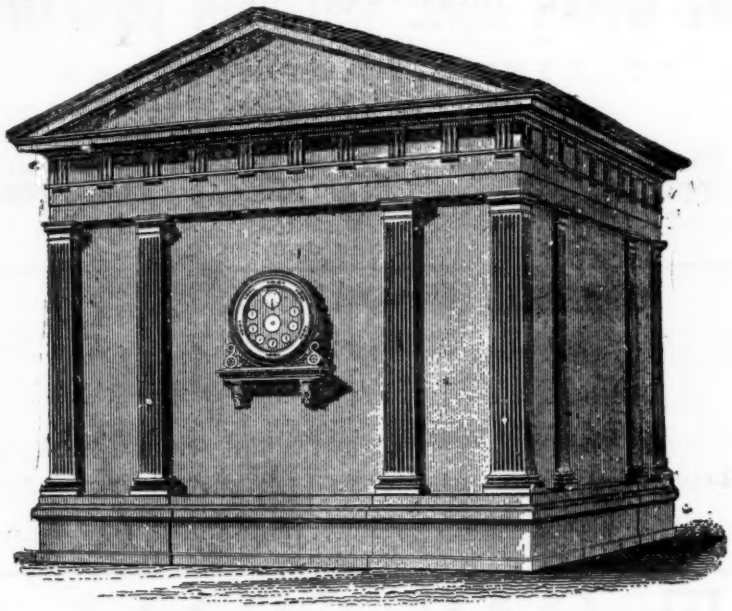

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Home and Foreign Orders promptly attended to.

All Sizes of CONSUMERS METERS, STATION-METERS, and GOVERNORS generally in Stock.

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TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.

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GAS AND CONSULTING ENGINEER,

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MR. ANDERSON advises Companies on all matters connected with the manufacture of Gas and the construction of Works.

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RETORT SETTINGS, heated by tar without the production of smoke.

STEAM-ENGINES and EXHAUSTERS, separately or combined.

FOUR-WAY VALVES, one of which is equal to three ordinary Valves.

STATION GOVERNORS—the Gasholder cannot tilt and cause accident.

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A Pamphlet containing Eighteen Illustrations of the foregoing, with letterpress on the construction of Works, post free, 2s. 6d.

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"The Author is well qualified to speak authoritatively upon the important subjects to which his pamphlet refers."—*Artizan.*

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As supplied to the Imperial, Chartered, and other London and Provincial Gas Companies. Bellows and Valves for inflating Well Dresses, Stokers Gloves, India-Rubber Suction and Delivery Hose, Gas-Tubing, Leather India-Rubber and Gutta-Percha Machine-Bands, Sheet and Washers and Steam Joints.

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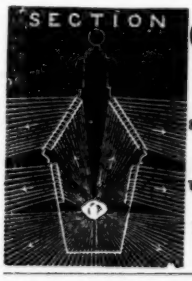

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Is now in use in Moorgate Street, Cheapside, and Trafalgar Square, and has been in successful operation upon Waterloo Bridge since Oct. 7, 1871.

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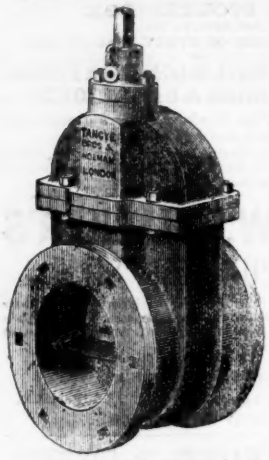

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2½	24	0
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4	36	0
5	45	0
6	54	0
7	63	0
8	80	0
9	90	0
10	100	0
12	135	0
14	180	0

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Of superior quality, delivered at any station in England and Wales.

Purified gas per ton of coal in cubic feet (average)	10,775
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Analysis by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—

(COPY.)

	Cubic Feet of Gas per Ton of Coal.	Illuminating Power in Candles.	Coke per Ton of Coal used.	Ash in Coke, per Cent.	Sulphur in Coal, per Cent.
Silkstone Nuts . . .	10·800	15·85	12·66 cwt.....	6·0	0·69

NOTE.—The illuminating power of the gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.

Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.

These Nuts are extensively used by various Gas Companies throughout the Kingdom, who bear strong testimony to their value.

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MUIRKIRK, No. 1, CANNEL
Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.

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Yields 10,700 cubic feet of 32·77-candle gas per ton, and 9½ cwts. of coke, containing 11 per cent. of ash.

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Yields 13,320 cubic feet of 32·5-candle gas per ton.
Prices and full Analyses on application.

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Of every description delivered f.o.b. United Kingdom, or cost freight and insurance Abroad, upon lowest terms.
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One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.
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Can offer a CANNEL COAL yielding a large quantity of Gas of superior quality.
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Supply or Contract for all the principal
SCOTCH CANNELS AND SPLINTS F.O.B. Scotland; or cost, freight, and insurance abroad.
Being Sole Agents for London and the Southern Counties, they can offer upon the very lowest terms.
English Coal also supplied.
Full Analysis and Prices on application.
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LIMITED,
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WYLAM WOOD CANNEL COAL WORKED FROM ABOVE COLLIERY.
Analysis—10,280 cubic feet of gas per ton of Coal, having an Illuminating Power of 26·2 Sperm Candles, and yields 13¼ cwt of Coke per ton of Coal.
PORTS OF SHIPMENT:
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For prices and further particulars, apply to
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NEWCASTLE-ON-TYNE.

CANNEL COAL.
COPPA COLLIERY, MOLD,
Beg leave to call the attention of Gas Companies to the superior quality of their
CANNEL FOR GAS-MAKING PURPOSES.
This Cannel produces in actual working, in iron retorts, 9300 cubic feet of 32-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.
Ports of shipment—Birkenhead or Connah's Quay.
Waggons supplied for delivery by railway to any part of England or Wales.
For particulars, prices, and rates of freight, apply to The Coppa Colliery, Mold, FLINTSHIRE.

SCOTCH CANNEL COALS.
The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.
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This Company request attention to the very superior quality of their Cannel Coals.

1. The following are the practical results given by Dr. Wallace, of Glasgow, of analyses of their Lochore and Capledrae Cannels:—

	Sample worked at Capledrae.	Sample worked at Lochore.
Gas per ton of coal, at 60° Fahr. and 30 inches barometric pressure	13,095 cubic feet.	11,760 cubic feet.
Illuminating power, in standard sperm candles, by union jet consuming 5 cubic feet per hour, at ·5-inch pressure	32·91	34·83
Value of 1 cubic foot of gas in grains of sperm	780	836
Equivalent of a ton of coal in pounds of sperm candles	1,459	1,404
Durability of 1 cubic foot by 5-inch flame	69 minutes.	71 minutes.
Gravity of the gas (air = 1000)	596	594

Remarks.—This (the sample from Capledrae) is a Cannel Coal of first-class quality, giving 13,000 feet of 33-candle gas. It contains only a minute proportion of sulphur, and the ash is almost quite white. The coke is of rather inferior quality.

Remarks on Sample from Lochore.—This is a Cannel Coal of first-class quality, giving a large yield of very rich gas and a coke of medium quality.

2. The following are the practical results of analyses by Dr. Wallace of the Company's Waverley Cannels:—

	Capledrae Waverley.	Lochore Waverley.
Gas per ton of coal, at 60° Fahr. and 30 inches barometer	9,120 cubic feet.	11,145 cubic feet.
Illuminating power, in standard candles, by union jet consuming 5 cubic feet per hour, at ·5-inch pressure	36·62	33·09
Value of 1 cubic foot of gas in grains of sperm	878	794
Equivalent of a ton of coal in pounds of sperm candles	1,145	1,264
Durability of 1 cubic foot of gas by 5-inch flame	80 minutes.	67 minutes.
Gravity of the gas (air = 1000)	677	597

Remarks on the Sample of Capledrae Waverley.—This Coal gives fully 9000 feet of gas of 36½ candles, and is admirably adapted for bringing up the quality of gas made from common coal or inferior qualities of cannel. The tests were made at a rather high temperature, this being one of the coals that stand a very high heat without serious diminution of the illuminating power of the gas The coke contains 60 per cent. of ash, and is therefore almost valueless, but the proportion of sulphur is very moderate.

Remarks on the Lochore Waverley.—This is a first-class Cannel Coal, giving 11,000 cubic feet of 33-candle gas. The quantity of sulphur is very minute, and the ash is nearly white. The coke is of inferior quality, but not wholly valueless.

Applications for full Copies of Analyses and Prices may be made to the Company, at

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DRY GAS-METERS,

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ALEXANDER WRIGHT & CO.,

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Of the highest excellence.

STATION-METERS AND GOVERNORS.

STREET-LAMP REGULATORS.

TESTING APPARATUS

Of the most perfect description for all purposes relating to Gas.

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STATION-METERS, ALL SIZES, up to 15 feet Square, with PLANED JOINTS;

Experimental Meters, Photometers, Pressure-Gauges,
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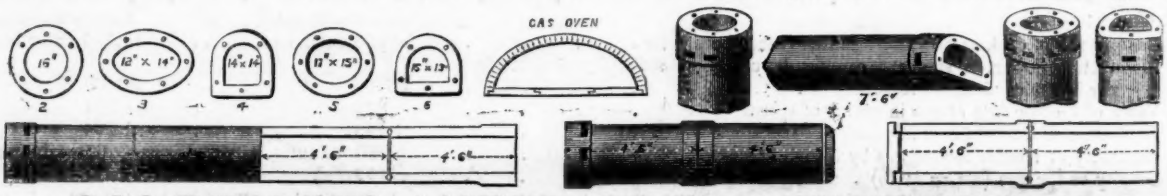

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A LARGE ASSORTMENT OF GAS-RETORTS IN STOCK.

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London: Printed by William Boughton King (at the office of Clayton and Co., 17, Bouverie Street, Fleet Street); and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, March 9, 1875.